

# NATIONAL GEOGRAPHIC

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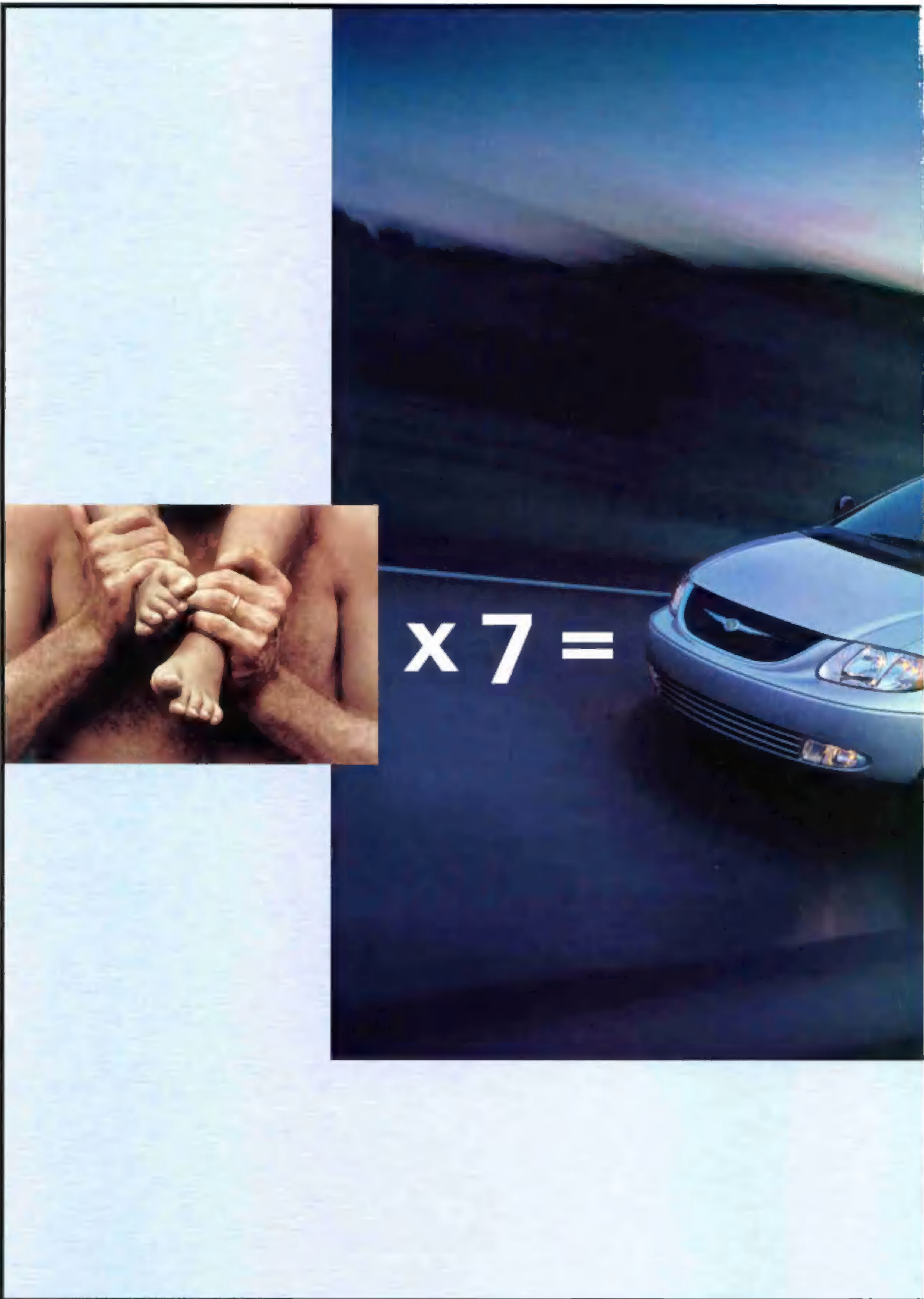
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x7 =

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## THE COVER

Its signature white feathers are still a few weeks away, but this snowy owl chick has already mastered looking fierce.

BY DANIEL J. COX

 Cover printed on recycled-content paper

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RICHARD J. COX/REX USA

I just got a glimpse of the real Hawai'i, the one few tourists see. Eighteen *kūpuna* (or elders, known to all as aunty or uncle) gave me the rarest of invitations: to join them on a trip to Moloka'i's Kaupoa Beach Village to dance, eat handmade *poi*, and "talk story"—to exchange memories of the old ways.

We talked over the noise of the engine of the school bus as it wound down the hills to the sea (that's me under the arm of Aunty Theo Purdy). Soon the *kūpuna*, members of a senior program dedicated to preserving native Hawaiian culture, pulled out guitars and ukuleles. Above the clatter and the whine of the bus rose the sweet sound of music. The voices swept years from their faces, and I imagine from mine too.

We arrived at the ocean, and Aunty Edna Cathcart chanted a Hawaiian greeting to our host, Pilipo Solatorio, offering him a gift, or *ho'okupu*, of food wrapped in *ti* leaves. As Pilipo chanted his welcome in return, the aunty wept. The chant, the gift, the music—all was executed according to strict form, as it would have been done centuries ago. This link with the past would survive.

The love and respect the *kūpuna* shared that day will always define for me the spirit of aloha. But here's the remarkable part: Until they joined their senior program, many of these *kūpuna* couldn't have performed these chants or made *poi* by hand. They'd lost touch with their heritage.

Will the ways of the Hawaiians survive? Now that I've met the *kūpuna*, I'm more confident of that. Decide for yourself after you read Paul Theroux's report beginning on page two.

*Bill Allen*



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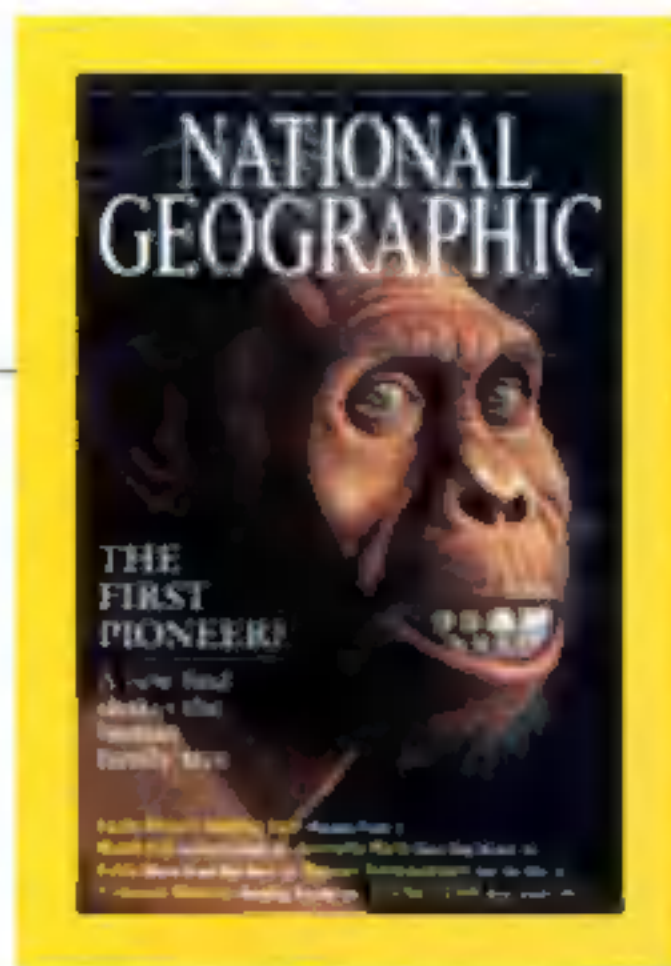
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# Forum

## August 2002

The issue generated plenty of mail from those who dispute evolution. And the cover made some readers wonder how the artist decided how much facial hair to paint. "Hair was the most speculative part of the reconstruction," says art director Christopher Sloan. Artist Mauricio Antón looked at the fossil's closest living analogues—chimps and humans—and used a hair pattern halfway between the two.



## New Skull Find From Georgia

It seems rather precipitous to draw broad conclusions about a species based on a single teenage specimen's skull. Don't we need more comparable individuals from the Georgian site before rethinking our entire past?

RUY JOSÉ VÁLKA ALVES  
*Museu Nacional  
Rio de Janeiro, Brazil*

While there can be no doubt that the creatures of the Dmanisi skulls existed, there can be much doubt that they were as human-like as the cover suggests, complete with hairdo. As an avid reader of the GEOGRAPHIC for over 50 years, I am weary of depictions of prehistoric animal bones dressed up to look human. *Homo erectus* may well have been our predecessor, but many other hominids may have been no more human than a chimp. What would some conclude if we had never seen a chimp or gorilla and then discovered one of their skulls? In 50 years I have never

seen the GEOGRAPHIC raise the possibility that man could be a divine creation, yet the possibility of evolution is promoted as fact. Because of this your credibility is diminished for a significant percentage of Americans.

ERIC SONERHOLM  
*Klamath Falls, Oregon*

I find it difficult to understand the excitement over the small size of the brain of the new find from Dmanisi. Animals with lower intelligence such as elephants, buffalo, cats, and canines have migrated from one corner of Earth to the other. Surely it is not intelligence that enables a species to migrate but the ability to feed itself, no matter how dumb the organism is. As long as it can find habitats that are hospitable, an animal should be able to travel wherever it wants.

LARRY WOELK  
*Camberley, England*

*Scientists' supposition that early humans needed a relatively large brain to leave Africa was built on the evidence available at the time: Before Dmanisi, the only human skulls found outside Africa had big braincases.*

The early human on the front cover and the Hummer SUV on

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**Henrietta Marie**

Given all the hand-wringing and apologizing for the "peculiar institution" of slavery in the United States, I found it satisfying to read this sentence in the first paragraph of the article: "The ship had left Africa with as many as 300 captives sold into slavery by fellow Africans." There are those among us who feel financial reparations to the descendants of slaves are in order. I ask why, then, is it not in order for the African nations of today, wherein reside the descendants of the very ones who captured and sold the slaves in the first place, to join in?

TED KIRBY  
Waynesville, North Carolina



REPRODUCED FROM PLATT

Your terse comment on the Editor's page that "one African was sold into slavery by another" is bound to misinform readers about the nature of the Atlantic slave trade. Such a summary statement gives the impression that the trade was simply the inhumanity of one African against another. You don't acknowledge the role Europeans and

North Americans played in selling firearms to rival ethnic groups; conspiring with middlemen to seize, purchase, transport, and warehouse captives; and providing seaworthy vessels and calloused crews to satisfy the lust for free labor back home. One of your pictures may be worth a thousand words,

but those eight little words undermine all the photographs of Africa with which you have educated us over the years.

GAYRAUD S. WILMORE  
Washington, D.C.

*For a more complete treatment of the African slave trade, see "The Cruellest Commerce," by Colin Palmer, NATIONAL GEOGRAPHIC, September 1992.*

the back cover ad have the same facial expression.

JOE KOWALSKI  
Waupun, Wisconsin

Modern humans don't always stay within their range either. Perhaps wanderlust should be added as a trait that defines what it is to be human.

JANE SMITH  
San Rafael, California

I enjoyed reading about "The First Pioneer." The fact that our ancestors "took a long hike" from Africa to Eurasia and made it despite a smaller brain size can mean only one thing—they were

led by males who wanted to go to South Africa but got lost and wouldn't stop to ask directions.

GLORIA KRUEGER  
Malone, Wisconsin

### South Africa's Oceans of Plenty

How many times have people referred to large concentrations of organisms in seemingly inexhaustible superlatives? There have been other "greatest shoals on Earth," such as the sardine and anchovy fisheries in the eastern Pacific and many other overexploited fish stocks. What about the endless herds of buffalo and flocks of passenger pigeons? All these examples have either been exterminated or permanently reduced. In every case, the culprit was overharvesting. The massive take by fishing boats will certainly bring South Africa's show to an end in my lifetime. The article implied, by omission, that there is currently

no regulation of the harvest and no thought toward the long-term prospects of South Africa's fisheries. When will we learn?

AHRASH N. BISSELL  
Durham, North Carolina

*South Africa sets catch quotas and limits the size of its fishing fleet. Such measures helped restore the sardine fishery after it crashed in the mid-1960s.*

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by Scarla Weeks and her colleagues at the University of Cape Town. These noxious eruptions may drive rock lobsters onto the shore, an event called a lobster walkout.

JAMES ACKER

NASA

Greenbelt, Maryland

About four years ago I was in South Africa. Even there it wasn't clear where the official border between the Atlantic and Indian Oceans is. Is Cape Agulhas considered the border between these two oceans?

TOBIAS KLEIN

Neubiberg, Germany

*Many cartographers regard Cape Agulhas (and the meridian on which it sits) as the dividing line between the oceans. The designation, however, is purely for reference purposes. The world's oceans are contiguous; there are no actual borders in the sea.*

### Mount Fuji

I was pleased to read that Mount Fuji has had a bit of a cleanup since my two ascents of the mountain in 1985 and 1986. At that time I was amazed and appalled at the quantity of glass, plastic, and paper on the slopes. Our first ascent on a sunny Saturday in May 1985 found about ten other climbers on the upper slopes of the mountain. If you're planning an ascent in July or August, anticipate a logjam of bodies during the entire trip up and down the mountain. But trips in May and September can be made in relative solitude when one can enjoy the serenity of the entire experience, and no food or lodging vendors will be there to bother you.

STUART KLEIN

Cobham, England

FROM OUR ONLINE FORUM

[nationalgeographic.com/ngm/0208](http://nationalgeographic.com/ngm/0208)

### Russian Smokejumpers

As a U.S. smokejumper, I was on a booster crew to Alaska in 1967. We jumped on a fire in the Yukon Territory on a tributary of the Porcupine River. Using a fishhook, fishing line, and a sapling, I caught 96 arctic graylings over three days, which we cooked to supplement our C rations. I take great exception to the comment of our brother smokejumper in Russia: "Put us in the woods with matches and a fishing rod, and we can live.

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Sponsor reserves the right, without notice, to void any and all entries of an entrant who Sponsor believes has attempted to tamper with, circumvent, the administration, security, access or operation of the Sweepstakes. **Prizes:** (1) Grand Prize: Get together trip for winner and up to 10 guests to a single destination of winner's choice with total trip expenses not to exceed \$40,000. Trip can include but is not limited to, round-trip air transportation, airfare, transportation to and from airports, accommodations in the U.S., hotel or other accommodations, ground transportation, and any other expenses incurred on-site trip activities which together total the \$40,000 amount such as, but not limited to, sightseeing excursions, food, entertainment and spending money. Maximum retail value of Grand Prize is \$40,000 (Approximate Retail Value "ARV" \$40,000). All other expenses in excess of the \$40,000, including trip expenses, are the responsibility of the individual winners. All expenses for trip activity arrangements, including the allocation of spending money, must be made prior to trip through arrangement of Sponsor's selection and PST. Winner subject to Sponsor's final approval. If actual trip expenses are approved by Sponsor are less than \$40,000, the difference will be used to offset \$20,000 ARV amount to winner to be used as spending money. Trip must be completed by January 2004. Trip destination subject to Sponsor's final approval and cannot be posted to U.S. Department of State's Travel Warnings (during time of departure). Grand Prize winners and each of their respective traveling companions must have valid passports (and if required) at time of departure. All restrictions may apply. (2) First Prizes: (15) Get together weekend trip for winner and up to 5 guests to a single destination of winner's choice in the United States or the Caribbean with total trip expenses not to exceed \$4,000. Trip can include but is not limited to, round-trip air transportation, airfare, transportation to and from airports, accommodations in the U.S., hotel or other accommodations, ground transportation, and any other expenses incurred on-site trip activities which together total the \$4,000 amount such as, but not limited to, sightseeing excursions, food, entertainment, and spending money. Maximum retail value of First Prize is \$4,000. All other expenses in excess of the \$4,000 maximum are the responsibility of the individual winners. All trip and on-site trip activity arrangements, including the allocation of spending money, must be made prior to trip through arrangement of Sponsor's selection and PST and are subject to Sponsor's final approval. If actual trip expenses are approved by Sponsor are less than \$4,000, the difference will be used to offset \$2,000 ARV amount to winner to be used as spending money. Trip must be completed by January 2004. All other restrictions may apply. (3) One-time prizes awarded in the amount of \$4,000 MasterCard Gift Card in lieu of trip prize (ARV \$4,000). (4) 1000 Second Prizes: \$250 MasterCard Gift Card which may be used toward a get-together weekend (ARV \$250). MasterCard Gift Cards will expire one year after the date of issuance and other restrictions may apply. Total ARV of all prizes is \$1,000,000. **Winner Selection:** Winners will be selected in a random drawing on or about 12/31/02 using a computer digital random number generator ("PST") an independent rating organization whose decision will be final and binding in all matters relating to this Sweepstakes. Winners will be notified by telephone and by mail. Prizes will be awarded to the primary cardholder of the MasterCard® member financial institution account records associated with the winning entry. If the primary cardholder is deceased, the individual named on the bank account or mail-in entry in the name of a corporate MasterCard® card will be used to determine the winning entry (as determined by the MasterCard® member financial institution's account records) and if existing or past or in contact with corporate policies, rules and regulations, the individual named on the bank account will be selected. Odds of winning will depend on the number of entries received. Limit one prize per person, immediate family member, or household. **Miscellaneous:** No transfer, assignment, cash redemption, or substitution of prizes for portion thereof except by agreement due to prize availability and then to a prize as applicable portion thereof, of equal or greater value. Federal, state, and local taxes and all other expenses not specified herein are winner's responsibility. Grand and First Prize winners will be required to execute and return an Affidavit of Eligibility, liability release and other legal documents within 5 days of receipt of prize. Traveling companions (1) a minor, their respective parent or legal guardian will be required to sign and return a liability release. (2) Infants, legal liability release prior to the issuance of travel documents. Non-compliance with any of these requirements may result in disqualification and forfeiture of prize to an alternate winner. If any prize is damaged, used or prize is returned as undeliverable, winner will be disqualified and alternate winner will be selected. By participating, entrants agree to be bound by these Official Rules and agree that: 1) Sponsor, MasterCard member financial institutions, PST, and each of their respective parent companies, operators, affiliates, distributors, subsidiaries, and advertising/promotion agencies (collectively, "Released Parties") shall have full right and permission to use (unless prohibited by law) their name, voice, likeness, photograph, and/or likeness for advertising and/or trade and any other purpose in any media or in any now or hereafter known without further compensation, permission, or consideration and 2) Released Parties and their designees and agents and all of their respective officers, directors, employees, representatives and agents shall have no liability and will be held harmless for any liability, loss, expense, damages or any other portion, including, without limitation, damage to property or real property, due in whole or in part directly or indirectly by reason of the acceptance, possession, use or prize is returned as undeliverable, winner will be disqualified and alternate winner will be selected. **Winning List:** For the winners' names, visit a web page at [www.mastercard.com](http://www.mastercard.com) or call 1-800-852-8888. 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**Consumer Disclosure:** This sweepstakes does not imply that you have won a prize. No purchase necessary to enter or win. Purchasing will not increase your chances of winning. Where prohibited, PIN-based & international transactions not eligible for automatic entry. Starts 10/15/02. Ends 12/31/02. Odds of winning depend on number of eligible entries received. See above for Official Rules and complete details. (1) Grand Prize: ARV=\$40,000. (2) First Prizes: ARV=\$4,000. (3) 1,000 Second Prizes: ARV=\$250.

But for American firefighters, it would be a very bad situation." Let's go on a fire together. Take your best shot!

DON BAKER  
Napa, California

The caption on page 92 seems to convey the message that the man wrapping his right foot does it out of poverty. I thought it would be of interest to learn that in fact footwraps, called *portianki*, are much more effective than socks in a knee-high boot. Socks can slide down and cause blisters while the trusty *portianki* stay in place.

IVAN S. ARTIOUCHINE  
Lexington, Kentucky

## Bahia

Having developed a warm spot in my heart for Bahia during geologic fieldwork there in the late 1990s, I was pleased to read Charles Cobb's article describing its rich cultural history. I was disappointed, however, to find few details about how Bahians have adapted their culture to the modern world. While the older generation still clings faithfully to Candomblé traditions, their children deliberately choose non-Portuguese names for their children to protest military rule in the '60s and '70s. Today their middle-class professional grandchildren frequent trendy restaurants where each traditional Candomblé sacrifice is on the menu as a main course. As interesting as Bahia's history is, the amazing thing about its people is the way they continue to absorb Western ideas in ways that enhance the richness of their culture.

CHARLES MAGEE  
Smithsonian Institution  
Washington, D.C.

## Geographica

I enjoyed your piece on shark tapeworms, but you neglected to mention Fred H. Whittaker of the University of Louisville. Dr. Whittaker has worked with these animals for many papers, and together we have published many papers on the subject.

JUAN CARVAJAL  
Universidad de Los Lagos  
Puerto Montt, Chile

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# GEOGR

T H E P E O P L E , P L A C E S , A N D



## CONSERVATION

# Borderland Comeback



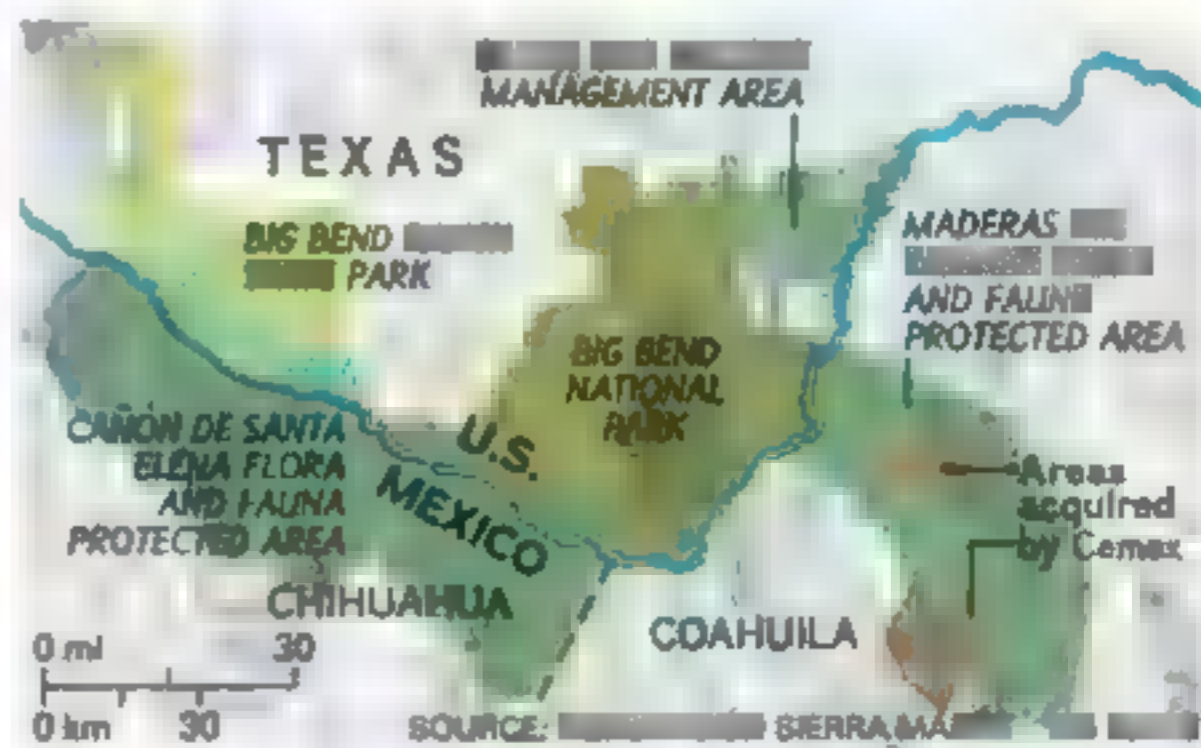
Sky islands: That's what ecologists call tree-covered ranges that rise from surrounding desert and scrubland. It suits Maderas del Carmen (above), 515,000 acres set aside for conservation in northern Mexico, part of a growing patchwork of protected Chihuahuan Desert lands along the U.S.-Mexico border. In these limestone mountains live 400 bird species (more than half the number commonly seen in the continental U.S.) and 70 mammal species, including one that's returning after a long absence, the desert bighorn sheep.

"The sheep were all shot out 60 years ago. It's a dream for us

to reintroduce them," says Patricio Robles Gil, president of Agrupación Sierra Madre, a conservation group spearheading the project. In the past two years nearly 50 sheep have been brought from an island in the Gulf of California (far right) to a 12,000-acre enclosure adjacent to Maderas del Carmen. "Once

we build up a herd, we'll begin releasing them," he says.

Established in 1994, Maderas del Carmen remains largely privately owned ranchland. Robles Gil recently worked with Cemex,

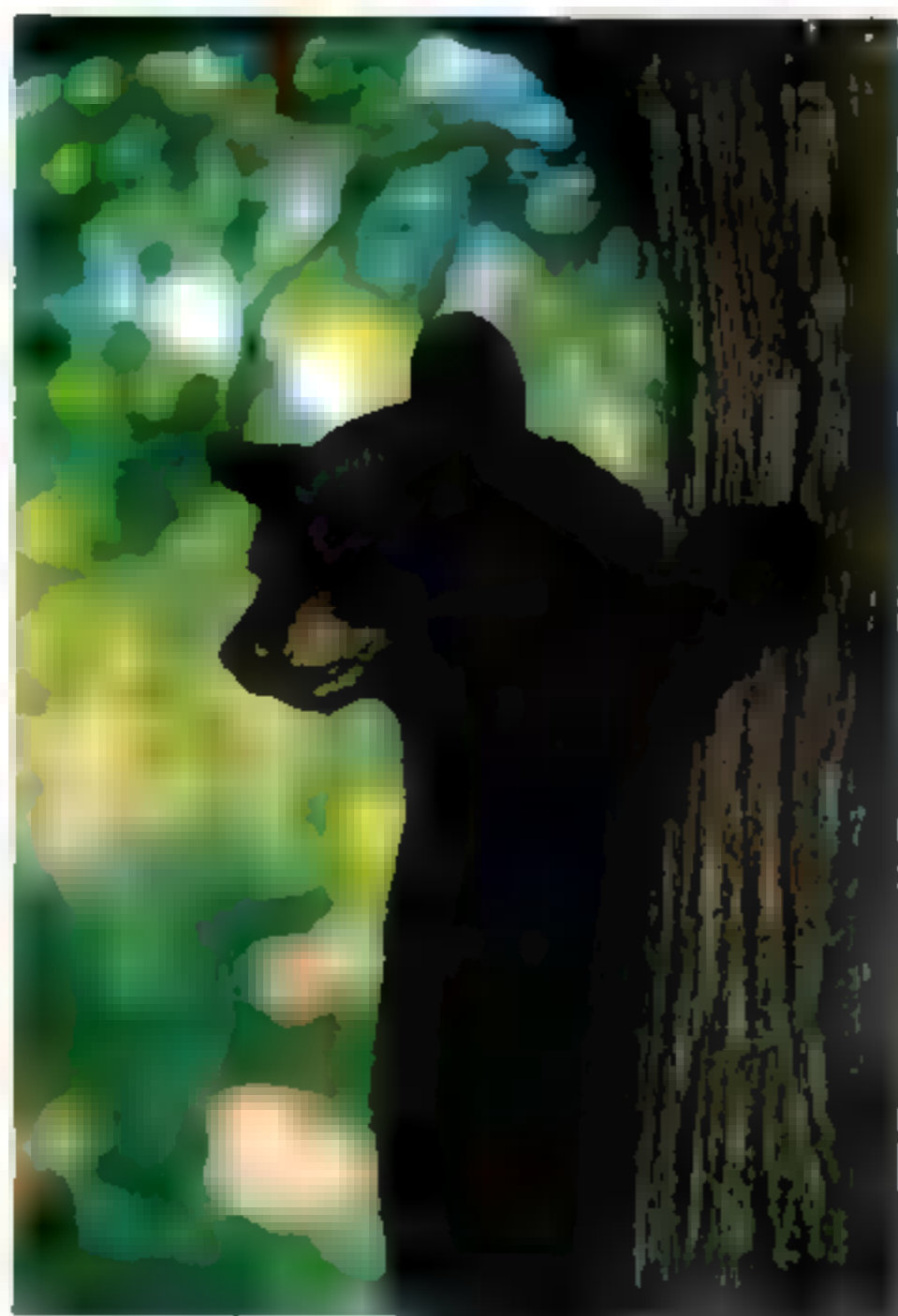


## WHY THE CHIHUAHUAN DESERT MATTERS

You've probably heard of the Sonoran Desert, but you may not know the quarter-million-square-mile desert to its east. The Chihuahuan Desert covers parts of Arizona, New Mexico, Texas, and 25 percent of Mexico's land surface. Nearly a quarter of the world's cactus species live here, and the World Wildlife Fund ranks it third in overall desert-species diversity, after Africa's Namib-Karoo region and Australia's Great Sandy Desert.

# A P H I C A

C R E A T U R E S   O F   O U R   U N I V E R S E



a Mexican cement company, to purchase 136,000 acres within and bordering del Carmen that will be more strictly conserved.

The expanding range of another del Carmen resident illustrates the value of corridors of protected land. Black bears



PATRICIO ROBLES GIL: AGREGACION SIERRA MADRE (ALL)

(above) now wander into Big Bend National Park, where they'd been absent for decades.

A bear helped teach Robles Gil about balancing the needs of wildlife and humans. He once spent time with a rancher who refused to kill bears even when they

killed livestock. "The rancher had a cowboy who raised pigs, and one day a bear killed one. The rancher said, 'If the bears kill all ten of your pigs, come back and tell me.' The bears killed them all, and the rancher paid the cowboy for his losses." —John L. Eliot

**TODAY**

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TRADITIONS

## The Houseplant That Roared

*How one marketing family conquered Christmas*

KEVIN CLIMING/ISTOCK

**P**aul Ecke's family has a tradition of keeping a few poinsettias around—at least half a million. The Ecke Ranch in Encinitas, California, is the world's largest producer of the country's best-selling potted

plant. (It may be irritating but it's not deadly—that's a myth.) In the 1920s Ecke's grandfather was the first to market the red-leaved Mexican shrub as a Christmas symbol. Last year more than 67 million were sold. Some 70

percent of poinsettias grown in the U.S. (above, in Delaware) originate from Ecke stock. But few compare to Paul Ecke's own Christmas poinsettia. Last year's was eight feet tall. He used it as a tree. —Margaret G. Zackowitz

ARCHAEOLOGY

## Back in Egypt, at Last

**D**ecades after it was stolen, the gilded wood base of an ancient coffin—perhaps once occupied by the mummy of the notorious Pharaoh Akhenaten—has finally returned to its rightful home, the Egyptian Museum in Cairo.

The twisted story began with the discovery of a tomb called KV 55 in 1907. The disintegrating coffin within—its lid, its base, and mummy—came to the museum by 1915. By 1931 the fragmented base had vanished. We now know it fell into the hands of a Swiss dealer, who tried to hawk it in the 1970s. In 1980 it was taken for restoration to the State Museum of Egyptian Art in Munich, Germany, and was eventually donated by the dealer's daughter. After 20 years



KENNETH GARRETT

of negotiation, Egypt won it back this year. It now lies under the museum's rotunda (above, at left), next to the lid.

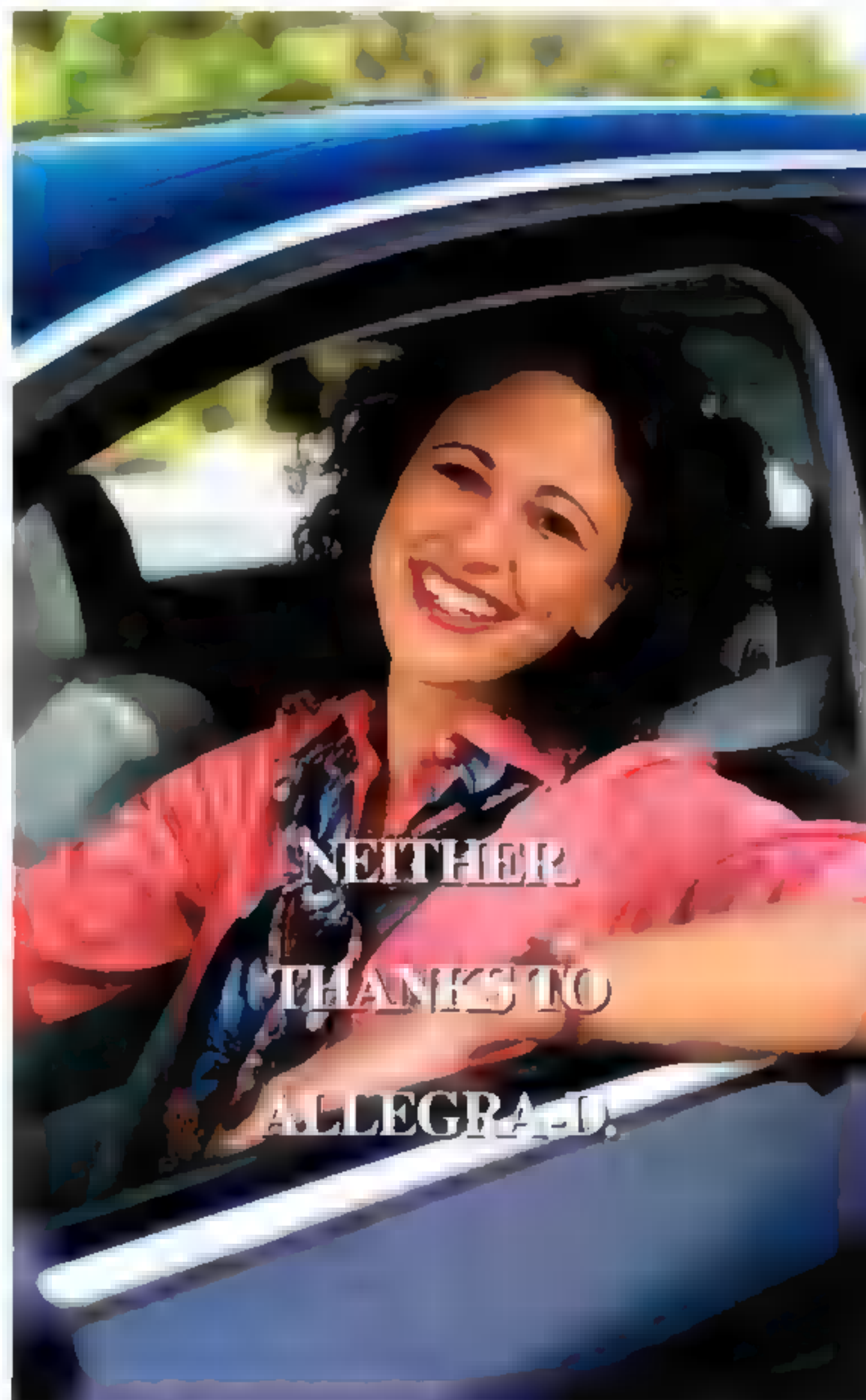
Egypt has a new weapon in the fight for repatriation: The Department of Stolen Artifacts has warned museums that holding stolen objects will mean the end of scientific ties. Two burial

masks from a U.S. collector and a statuette from a Dutch collector are among 2002's recoveries.

—Zahi Hawass  
EXPLORER-IN-RESIDENCE

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Side effects with Allegra-D were similar to Allegra alone and may include headache, insomnia, and nausea. Due to the decongestant (pseudoephedrine) component in Allegra-D, this product must not be used if you: are taking an MAO inhibitor (a medication for depression) or have stopped taking an MAO inhibitor within 14 days; retain urine; have narrow-angle glaucoma; have severe high blood pressure or severe heart disease. You should also tell your doctor if you have high blood pressure, diabetes, heart disease, glaucoma, thyroid disease, impaired kidney function, or symptoms of an enlarged prostate such as difficulty urinating. Allegra-D is for people twelve and older.

#### Multi-Symptom Relief:

The stuffy nose and sneezing from seasonal allergies can make any drive hard to take. Only Allegra-D has fexofenadine plus pseudoephedrine. So it provides real relief from allergies and congestion, without the drowsiness that can be caused by many other antihistamines.

**Talk to your doctor about Allegra-D, and get on the road to relief today.**

**For more information, visit [allegra.com](http://allegra.com) or call 1-800-allegra.**

**Real relief. For real living.**

**allegra-D**  
fexofenadine HCl 120 mg/pseudoephedrine HCl 120 mg  
Extended-Release Tablets

## ALLEGRA-D® (fexofenadine HCl 60 mg and pseudoephedrine HCl 120 mg) Extended-Release Tablets

### INDICATIONS AND USAGE

ALLEGRA-D is indicated for the relief of symptoms associated with seasonal allergic rhinitis in adults and children 12 years of age and older. Symptoms treated effectively include sneezing, rhinorrhea, itchy nose/palate/ and/or throat, itchy/watery/red eyes, and nasal congestion. ALLEGRA-D should be administered when both the antihistaminic properties of fexofenadine hydrochloride and the nasal decongestant properties of pseudoephedrine hydrochloride are desired (see CLINICAL PHARMACOLOGY).

### CONTRAINDICATIONS

ALLEGRA-D is contraindicated in patients with known hypersensitivity to any of its ingredients.

Due to its pseudoephedrine component, ALLEGRA-D is contraindicated in patients with narrow-angle glaucoma or urinary retention, and in patients receiving monoamine oxidase (MAO) inhibitor therapy or within fourteen (14) days of stopping such treatment (see Drug Interactions section). It is also contraindicated in patients with severe hypertension, or severe coronary artery disease, and in those who have shown hypersensitivity or idiosyncrasy to its components, to adrenergic agents, or to other drugs of similar chemical structures. Manifestations of patient idiosyncrasy to adrenergic agents include: insomnia, dizziness, weakness, tremor, or arrhythmias.

### WARNINGS

Sympathomimetic amines should be used judiciously and sparingly in patients with hypertension, diabetes mellitus, ischemic heart disease, increased intraocular pressure, hyperthyroidism, renal impairment, or prostatic hypertrophy (see CONTRAINDICATIONS). Sympathomimetic amines may produce central nervous system stimulation with convulsions or cardiovascular collapse with accompanying hypotension.

### PRECAUTIONS

#### General

Due to its pseudoephedrine component, ALLEGRA-D should be used with caution in patients with hypertension, diabetes mellitus, ischemic heart disease, increased intraocular pressure, hyperthyroidism, renal impairment, or prostatic hypertrophy (see WARNINGS and CONTRAINDICATIONS). Patients with decreased renal function should be given a lower initial dose (one tablet per day) because they have reduced elimination of fexofenadine and pseudoephedrine (See CLINICAL PHARMACOLOGY and DOSAGE AND ADMINISTRATION).

#### Information for Patients

Patients taking ALLEGRA-D tablets should receive the following information: ALLEGRA-D tablets are prescribed for the relief of symptoms of seasonal allergic rhinitis. Patients should be instructed to take ALLEGRA-D tablets only as prescribed. **Do not exceed the recommended dose.** If nervousness, dizziness, or sleeplessness occur, discontinue use and consult the doctor. Patients should also be advised against the concurrent use of ALLEGRA-D tablets with over-the-counter antihistamines and decongestants.

The product should not be used by patients who are hypersensitive to it or to any of its ingredients. Due to its pseudoephedrine component, this product should not be used by patients with narrow-angle glaucoma, urinary retention, or by patients receiving a monoamine oxidase (MAO) inhibitor or within 14 days of stopping use of MAO inhibitor. It also should not be used by patients with severe hypertension or severe coronary artery disease.

Patients should be told that this product should be used in pregnancy or lactation only if the potential benefit justifies the potential risk to the fetus or nursing infant. Patients should be cautioned not to break or chew the tablet. Patients should be directed to swallow the tablet whole. Patients should be instructed not to take the tablet with food. Patients should also be instructed to store the medication in a tightly closed container in a cool, dry place, away from children.

#### Drug Interactions

Fexofenadine hydrochloride and pseudoephedrine hydrochloride do not influence the pharmacokinetics of each other when administered concomitantly.

Fexofenadine has been shown to exhibit minimal (ca. 5%) metabolism. However, co-administration of fexofenadine with ketoconazole and erythromycin led to increased plasma levels of fexofenadine. Fexofenadine had no effect on the pharmacokinetics of erythromycin and ketoconazole. In

two separate studies, fexofenadine HCl 120 mg BID (twice the recommended dose) was co-administered with erythromycin 500 mg every 8 hours or ketoconazole 400 mg once daily under steady-state conditions to normal, healthy volunteers (n=24, each study). No differences in adverse events or QT<sub>c</sub> interval were observed when subjects were administered fexofenadine HCl alone or in combination with erythromycin or ketoconazole. The findings of these studies are summarized in the following table:

Effects on Steady-State Fexofenadine Pharmacokinetics After 7 Days of Co-Administration with Fexofenadine Hydrochloride 120 mg Every 12 Hours (twice recommended dose) in Normal Volunteers (n=24)		
Concomitant Drug	C <sub>max, SS</sub> (Peak plasma concentration)	AUC <sub>SS(0-12h)</sub> (Extent of systemic exposure)
Erythromycin (500 mg every 8 hrs)	+82%	+109%
Ketoconazole (400 mg once daily)	+135%	+164%

The changes in plasma levels were within the range of plasma levels achieved in adequate and well-controlled clinical trials.

The mechanism of these interactions has been evaluated in *in vitro*, *in situ* and *in vivo* animal models. These studies indicate that ketoconazole or erythromycin co-administration enhances fexofenadine gastrointestinal absorption. *In vivo* animal studies also suggest that in addition to enhancing absorption, ketoconazole decreases fexofenadine gastrointestinal secretion, while erythromycin may also decrease biliary excretion.

ALLEGRA-D tablets (pseudoephedrine component) are contraindicated in patients taking monoamine oxidase inhibitors and for 14 days after stopping use of a MAO inhibitor. Concomitant use with antihypertensive drugs which interfere with sympathetic activity (eg, methyldopa, mecamylamine, and reserpine) may reduce their antihypertensive effects. Increased ectopic pacemaker activity can occur when pseudoephedrine is used concomitantly with digitalis.

Care should be taken in the administration of ALLEGRA-D concomitantly with other sympathomimetic amines because combined effects on the cardiovascular system may be harmful to the patient (see WARNINGS).

#### Carcinogenesis, Mutagenesis, Impairment of Fertility

There are no animal or *in vitro* studies on the combination product fexofenadine hydrochloride and pseudoephedrine hydrochloride to evaluate carcinogenesis, mutagenesis, or impairment of fertility.

The carcinogenic potential and reproductive toxicity of fexofenadine hydrochloride were assessed using terfenadine studies with adequate fexofenadine exposure (area-under-the plasma concentration versus time curve [AUC]). No evidence of carcinogenicity was observed when mice and rats were given daily oral doses up to 150 mg/kg of terfenadine for 18 and 24 months, respectively. In both species, 150 mg/kg of terfenadine produced AUC values of fexofenadine that were approximately 3 times the human AUC at the maximum recommended daily oral dose in adults.

Two-year feeding studies in rats and mice conducted under the auspices of the National Toxicology Program (NTP) demonstrated no evidence of carcinogenic potential with ephedrine sulfate, a structurally related drug with pharmacological properties similar to pseudoephedrine, at doses up to 10 and 27 mg/kg, respectively (approximately 1/3 and 1/2, respectively, the maximum recommended daily oral dose of pseudoephedrine hydrochloride in adults on a mg/m basis).

In *in vitro* (Bacterial Reverse Mutation, CHO/HGPRT Forward Mutation, and Rat Lymphocyte Chromosomal Aberration assays) and *in vivo* (Mouse Bone Marrow Micronucleus assay) tests, fexofenadine hydrochloride revealed no evidence of mutagenicity.

Reproduction and fertility studies with terfenadine in rats produced no effect on male or female fertility at oral doses up to 300 mg/kg/day. However, reduced implants and post implantation losses were reported at 300 mg/kg. A reduction in implants was also observed at an oral dose of 150 mg/kg/day. Oral doses of 150 and 300 mg/kg of terfenadine produced AUC values of fexofenadine that were approximately 3 and 4 times, respectively, the human AUC at the maximum recommended daily oral dose in adults.

#### Pregnancy

**Teratogenic Effects:** Category C. Terfenadine alone was not teratogenic in rats and rabbits at oral doses up to 300 mg/kg; 300 mg/kg of terfenadine produced fexofenadine AUC values that were approximately 4 and 30 times, respectively, the human AUC at the maximum recommended daily oral dose in adults.

The combination of terfenadine and pseudoephedrine hydrochloride in a ratio of 1:2 by weight was studied in rats and rabbits. In rats, an oral combination dose of 150/300 mg/kg produced reduced fetal weight and delayed ossification with a finding of wavy ribs. The dose of 150 mg/kg



**ALLEGRA<sup>®</sup>**  
(fexofenadine hydrochloride)  
Capsules and Tablets

of terfenadine in rats produced ■ AUC value of fexofenadine that was approximately 3 times the human AUC at the maximum recommended daily oral dose in adults. The dose of 300 mg/kg of pseudoephedrine hydrochloride in rats was approximately 10 times the maximum recommended daily oral dose in adults ■ a mg/m<sup>2</sup> basis. In rabbits, an oral combination dose of 100/200 mg/kg produced decreased fetal weight. By extrapolation, the AUC of fexofenadine for 100 mg/kg orally of terfenadine was approximately 10 times the human AUC at the maximum recommended daily oral dose in adults. The dose of 200 mg/kg of pseudoephedrine hydrochloride was approximately 15 times the maximum recommended daily oral dose in adults on a mg/m<sup>2</sup> basis.

There are no adequate and well-controlled studies in pregnant women. ALLEGRA-D should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

**Nonteratogenic Effects.** Dose-related decreases in pup weight gain and survival were observed in rats exposed to an oral dose of 150 mg/kg of terfenadine. This dose produced ■ AUC of fexofenadine that was approximately 3 times the human AUC at the maximum recommended daily oral dose in adults.

**Nursing Mothers**

It is not known if fexofenadine is excreted in human milk. Because many drugs are excreted in human milk, caution should be used when fexofenadine hydrochloride is administered to a nursing woman. Pseudoephedrine hydrochloride administered alone distributes into breast milk of lactating human females. Pseudoephedrine concentrations in milk are consistently higher than those in plasma. The total amount of drug in milk as judged by AUC is 2 to 3 times greater than the plasma AUC. The fraction of a pseudoephedrine dose excreted in milk is estimated to be 0.4% to 0.7%. A decision should be made whether to discontinue nursing ■ to discontinue the drug, taking into account the importance of the drug to the mother. Caution should be exercised when ALLEGRA-D ■ administered to nursing women.

**Pediatric Use**

Safety and effectiveness of ALLEGRA-D in pediatric patients under the age of 12 years have not been established.

**Geriatric Use**

Clinical studies of ALLEGRA-D did not include sufficient numbers of patients aged 65 and older to determine whether they respond differently from younger patients. Other reported clinical experience has not identified differences in responses between the elderly and younger patients, although the elderly are more likely to have adverse reactions to sympathomimetic amines. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy.

The pseudoephedrine component of ALLEGRA-D is known to be substantially excreted by the kidney, and the risk of toxic reactions to this drug may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, ■ should be taken in dose selection, and it may be useful to monitor renal function.

**ADVERSE REACTIONS**

**ALLEGRA-D**

In one clinical trial (n=651) in which 215 patients with seasonal allergic rhinitis received the 60 mg fexofenadine hydrochloride/120 mg pseudoephedrine hydrochloride combination tablet twice daily for up to ■ weeks, adverse events were similar to those reported either in patients receiving fexofenadine hydrochloride 60 mg alone (n=218 patients) or in patients receiving pseudoephedrine hydrochloride 120 mg alone (n=218). A placebo group was not included in this study.

The percent of patients who withdrew prematurely because of adverse events was 3.7% for the fexofenadine hydrochloride/pseudoephedrine hydrochloride combination group, 0.5% for the fexofenadine hydrochloride group, and 4.1% for the pseudoephedrine hydrochloride group. All adverse events that were reported by greater than 1% of patients who received the recommended daily dose of the fexofenadine hydrochloride/pseudoephedrine hydrochloride combination are listed in the following table.

**Adverse Experiences Reported in One Active-Controlled Seasonal Allergic Rhinitis Clinical Trial at Rates of Greater than 1%**

Adverse Experience	60 mg Fexofenadine Hydrochloride/120 mg Pseudoephedrine Hydrochloride Combination Tablet Twice Daily (n=215)	Fexofenadine Hydrochloride 60 mg Twice Daily (n=218)	Pseudoephedrine Hydrochloride 120 mg Twice Daily (n=218)
Headache	13.0%	11.5%	17.4%
Insomnia	12.6%	3.2%	13.3%
Nausea	7.4%	0.5%	5.0%
Dry Mouth	2.8%	0.5%	5.5%
Dyspepsia	2.8%	0.5%	0.9%
Throat Irritation	2.3%	1.8%	0.5%
Dizziness	1.9%	0.0%	3.2%
Agitation	1.9%	0.0%	1.4%
Back Pain	1.9%	0.5%	0.5%
Palpitation	1.9%	0.0%	0.9%
Nervousness	1.4%	0.5%	1.8%
Anxiety	1.4%	0.0%	1.4%
Upper Respiratory Infection	1.4%	0.9%	0.9%
Abdominal Pain	1.4%	0.5%	0.5%

Many of the adverse events occurring in the fexofenadine hydrochloride/pseudoephedrine hydrochloride combination group were adverse events also reported predominately in the pseudoephedrine hydrochloride group, such as insomnia, headache, nausea, dry mouth, dizziness, agitation, nervousness, anxiety, and palpitation.

**Fexofenadine Hydrochloride**

In placebo-controlled clinical trials, which included 2461 patients receiving fexofenadine hydrochloride at doses of 20 mg to 240 mg twice daily, adverse events were similar in fexofenadine hydrochloride and placebo-treated patients. The incidence of adverse events, including drowsiness, was not dose related and was similar across subgroups defined by age, gender, and race. The percent of patients who withdrew prematurely because of adverse events was 2.2% with fexofenadine hydrochloride vs 3.3% with placebo.

Events that have been reported during controlled clinical trials involving seasonal allergic rhinitis and chronic idiopathic urticaria patients with incidences less than 1% and similar to placebo and have been rarely reported during postmarketing surveillance include: insomnia, nervousness, and sleep disorders or paroniria. In rare cases, rash, urticaria, pruritus and hypersensitivity reactions with manifestations such ■ angioedema, chest tightness, dyspnea, flushing and systemic anaphylaxis have been reported.

**Pseudoephedrine Hydrochloride**

Pseudoephedrine hydrochloride may cause mild CNS stimulation in hypersensitive patients. Nervousness, excitability, restlessness, dizziness, weakness, or insomnia may occur. Headache, drowsiness, tachycardia, palpitation, pressor activity, and cardiac arrhythmias have been reported. Sympathomimetic drugs have also been associated with other untoward effects such as fear, anxiety, tenseness, tremor, hallucinations, seizures, pallor, respiratory difficulty, dysuria, and cardiovascular collapse.

**Prescribing Information as of November 2000**

Aventis Pharmaceuticals Inc.  
Kansas City, MO 64137 USA

US Patents 4,254,129; 5,375,693; 5,578,610.

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ALD-JA-2070-1



Aventis Pharmaceuticals  
Bridgewater, NJ 08807



between 6 and 13 billion barrels of oil—compared with 4 to 12 billion for ANWR. But those numbers don't factor in recovery costs. At current prices, 22 to 30 dollars a barrel, more of ANWR's oil would be economically recoverable. That's because NPRA's oil lies in thin, widely spaced deposits—probably at greater depths than ANWR's—making it more expensive to extract. If the price rises above 35 dollars a barrel, the amount of economically recoverable oil at either site would be about the same.

Conservationists' concerns about impact on wildlife in NPRA echo those for ANWR. "The reserve has some of the world's best migratory bird habitat," says Deb Moore of the Northern Alaska Environmental Center. "And it includes the calving grounds for more than 470,000 caribou." —*John L. Eliot*

## ENERGY

## Alaska's Other Big Oil Target

*Wildlife-rich reserve's potential may equal ANWR's*

There's more than one controversial oil patch on Alaska's North Slope. Only about 100 miles west of the Arctic National Wildlife Refuge (ANWR), long coveted for its oil and gas, lies the National Petroleum Reserve-Alaska (NPRA)—and it may have more oil than its famous neighbor.

The 22.5-million-acre federal reserve, largely ignored by the oil

industry since its creation in 1923, hasn't produced any oil. The focus has been instead on a 1.5-million-acre section on ANWR's coast. But opposition to drilling in the refuge and the 1996 discovery of the Alpine field just east of NPRA is shifting industry interest westward.

The U.S. Geological Survey has reassessed NPRA's potential, which now is thought to be

## BIOARCHITECTURE

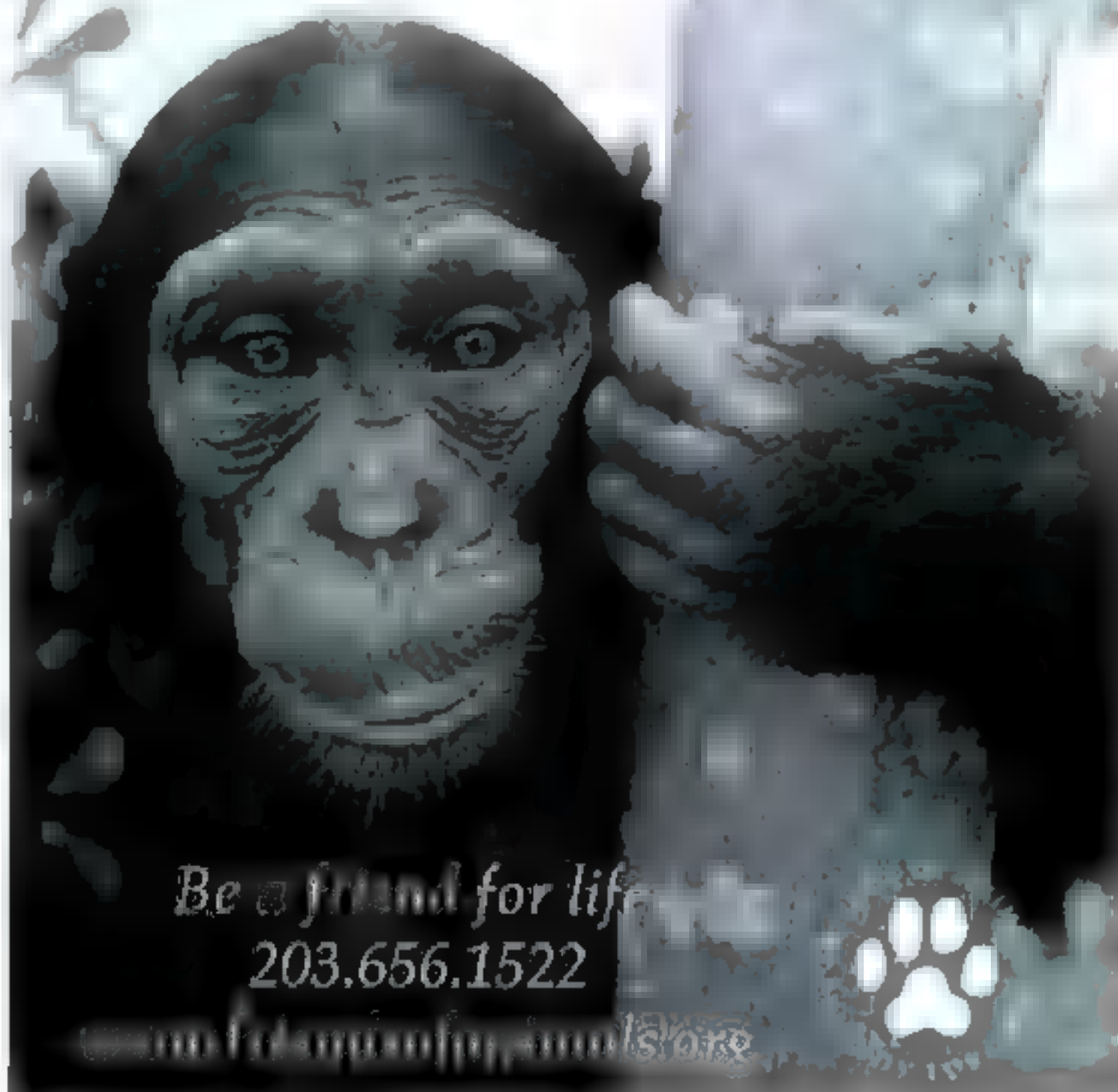
## A Mist Opportunity

Namibia's *Stenocara* beetle, whose bumpy back gathers moisture from fog, is teaching architects in arid lands to build better roofs. Oxford biologist Andrew Parker has discovered that the slightly flattened peaks on the bug's back attract water. Droplets then run into waxy, water-repellent valleys and are channeled into the mouth. With physicist Chris Lawrence, Parker has duplicated and enlarged this design for tents and rooftops, increasing fog-harvesting efficiency. "Animals are master engineers, so we copy them," says Parker, who has also modeled a nonreflective plastic after the eye of a 45-million-year-old fossil fly. —*Jennifer Steinberg*



ANDREW R. PARKER

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IN MEMORIAM  
**STEPHEN E. AMBROSE**

JANUARY 10, 1936 - OCTOBER 13, 2002



National Geographic Society joins the nation in mourning the loss of our friend and colleague Stephen Ambrose. A National Geographic explorer-in-residence, author of two books for the Society *The Mississippi and the Making of a Nation*; *Lewis & Clark: Voyage of Discovery*, consultant on the National Geographic large format film *Lewis & Clark: Great Journey West*, and tireless advocate for the Lewis and Clark Trail, Stephen Ambrose was a dedicated historian, educator, and conservationist, whose work touched millions of lives. He will be dearly missed.

A portion of the proceeds from *Lewis & Clark: Great Journey West* will be donated to National Geographic's newly established "Stephen Ambrose Trail Stewardship Award."



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# Behind the SCENES

AT THE NATIONAL GEOGRAPHIC SOCIETY



## A Kick Start for Afghan Life

*Helping create free  
media in a broken land*

The Taliban used Kabul's stadium as a site for executions. But during this year's World Cup, Afghans flocked to the stadium to watch soccer games on a screen of sewn-together parachutes (above).

An organization called Aina, founded by photographer Reza, a regular contributor to NATIONAL GEOGRAPHIC, arranged for the

screenings to show that the Afghan capital was returning to normal. It was just one of many efforts by Aina, which means "mirror," to help revive Afghanistan's cultural life. Supported by UNESCO, foreign governments, private agencies, and individuals—including several Society representatives—Aina has helped launch nine weekly and monthly

newspapers and magazines, hired street kids (below, left) as vendors, created nine mobile cinemas to show films on such topics as land mines and disease prevention, and opened a media center to train local journalists. That, says Reza, is Aina's true mission: "Freedom has come to Kabul, but freedom will have no meaning without free, independent media." For more about Aina: [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).



### A GENEROUS GIFT

Making a will? If you want to back the Society's research, exploration, and education efforts, consider following the example of **Adele M. Gottschalk**, a California surgeon who named the Society a beneficiary of her retirement account. The Society received a \$719,000 bequest from her estate after her death last September. For information call 202-828-6685.

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# International Geography Poll

*U.S. still lags in results*

This year the Society commissioned a poll of geographic knowledge among young adults 18 to 24 in the U.S. and eight other nations. Questions on pressing world issues revealed alarming results. Fewer than 25 percent of respondents in six of the nations could name four countries that acknowledge having nuclear weapons. Americans finished next to last in the survey. Says Terry Garcia, Executive Vice President of the Society's Mission Programs: "The lack of global awareness reflected in these results is truly disturbing. We're issuing the report as an urgent worldwide call to improve geographic literacy."

There is some hope. In the 2002 poll, far more young Americans reported taking geography between 7th and 12th grades—and they did better on the test. Another recent study found that 8th graders whose teachers participated in the Society's professional development programs knew significantly more about geography than other students.



## TRY IT YOURSELF

Here's a sample from the 2002 National Geographic Society-RoperASW poll of geographic literacy. In this section of the survey, respondents were asked to locate 11 countries (right) on a numbered map of Asia. Despite the importance and visibility of these places in recent news headlines, American 18-to-24-year-old respondents correctly named, on average, just 3.1 countries, ahead of only their Mexican

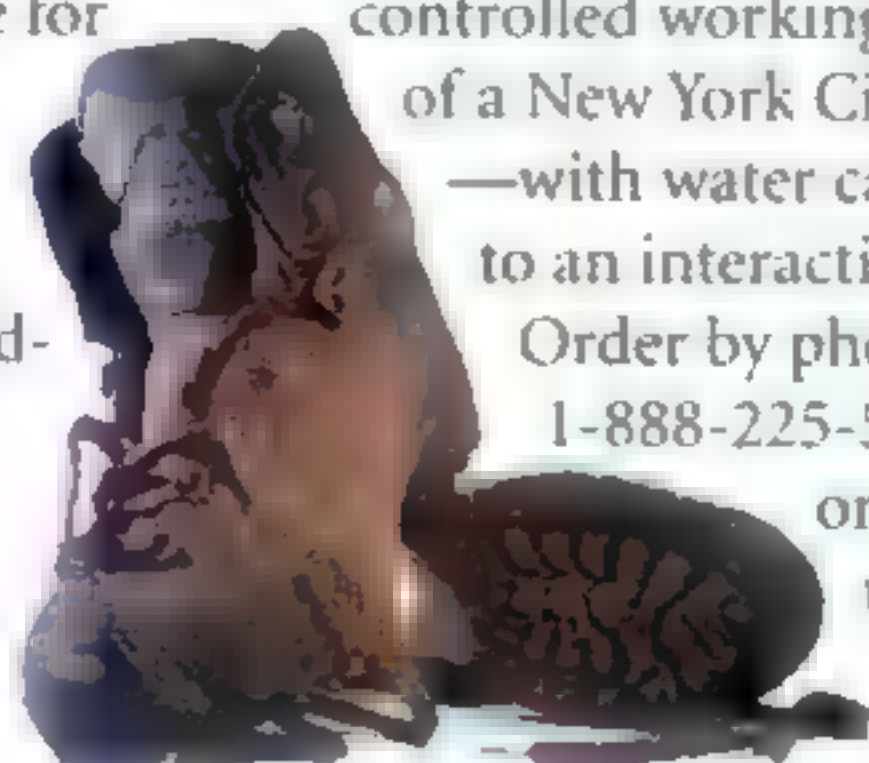
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SAUDI ARABIA	_____
INDONESIA	_____
JAPAN	_____

counterparts, who averaged 2.3 correct answers. At the top of the list stood German 18-to-24-year-olds, who identified 6.7 of the 11 correctly, followed by

Swedes (6.3), Italians (6.0), and Japanese (5.7). Try testing yourself. We're making it a bit easier by numbering fewer countries on the map. Correct answers are at right. Quiz yourself further online at [nationalgeographic.com/roperpoll](http://nationalgeographic.com/roperpoll).

## Gifts Tested in the Field, by Us

These boots are made for croc hunting. Like many products in the Society's Holiday 2002 Gift Catalog, they were field-tested by staffers, in this case by Brady Barr, the Society's resident TV host/herpetologist. You won't



find Brady's boots in the catalog, but you can order a pair (see below). The catalog also includes over 250 gift ideas, from a radio-controlled working model of a New York City fireboat—with water cannon—to an interactive globe. Order by phone at 1-888-225-5647, or online at [www.shopng.com](http://www.shopng.com).

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**"To keep our weekend dates, I'll keep taking care of my diabetes."**

"We meet at the cafe, and then move on to some adventure—like a vintage car show or salsa lessons. She always has a plan. And I never want to let my diabetes keep me from enjoying our time together.

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"*Avandia* has helped me keep my blood sugar down for over a year now. And while not everyone gets the same results, I've been able to manage my diabetes with confidence. And I can enjoy my life—including all our crazy weekends."

*Avandia*, along with diet and exercise, helps improve blood sugar control. It may be prescribed alone, with Glucophage<sup>®</sup> (metformin HCl tablets) or with sulfonylureas. When taking *Avandia* with a sulfonylurea, you may be at risk for low blood sugar. Ask your doctor whether you need to lower your sulfonylurea dosage.

Some people may experience tiredness, weight gain or swelling with *Avandia*.

*Avandia* in combination with insulin may increase the risk of serious heart problems. Because of this, talk to your doctor before using *Avandia* and insulin together. *Avandia* may cause fluid retention, or swelling, which could lead to or worsen heart failure, so tell your doctor if you have a history of these conditions. If you experience an unusually rapid increase in weight, swelling or shortness of breath while taking *Avandia*, talk to your doctor immediately. *Avandia* is not for everyone. If you have severe heart failure or active liver disease, *Avandia* is not recommended.

Also, blood tests to check for serious liver problems should be conducted before and during *Avandia* therapy. Tell your doctor if you have liver disease, or if you experience unexplained tiredness, stomach problems, dark urine or yellowing of the skin while taking *Avandia*.

If you are nursing, pregnant or thinking about becoming pregnant, or if you are a premenopausal woman who is not ovulating, talk to your doctor before taking *Avandia*.

**See important patient information on the adjacent page.**

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 GlaxoSmithKline

## Patient Information about AVANDIA® (rosiglitazone maleate) 2 mg, 4 mg, and 8 mg Tablets

### What is Avandia?

Avandia is one product in a class of prescription drugs called thiazolidinediones (thigh-a-zol-a-deen-die-owns) or TZDs. It is used to treat type 2 diabetes by helping the body use the insulin that it is already making. Avandia comes as pills that can be taken either once a day or twice a day to help improve blood sugar levels.

### How does Avandia treat type 2 diabetes?

If you have type 2 diabetes, your body probably still produces insulin but it is not able to use the insulin efficiently. Insulin is needed to allow sugar to be carried from the bloodstream into many cells of the body for energy. If insulin is not being used correctly, sugar does not enter the cells very well and builds up in the blood. If not controlled, the high blood sugar level can lead to serious medical problems, including kidney damage, blindness and amputation.

Avandia helps your body use insulin by making the cells more sensitive to insulin so that the sugar can enter the cell.

### How quickly will Avandia begin to work?

Avandia begins to reduce blood sugar levels within 2 weeks. However, since Avandia works to address an important underlying cause of type 2 diabetes, insulin resistance, it may take 8 to 12 weeks to see the full effect. If you do not respond adequately to your starting dose of Avandia, your physician may increase your daily dose to improve your blood sugar control.

### How should I take Avandia?

Your doctor may tell you to take Avandia once a day or twice a day (in the morning and evening). It can be taken with or without meals. Food does not affect how Avandia works. To help you remember to take Avandia, you may want to take it at the same time every day.

### What if I miss a dose?

If your doctor has prescribed Avandia for use once a day:

- As soon as you remember your missed dose, take one tablet anytime during the day.
- If you forget and go a whole day without taking a dose, don't try to make it up by adding another dose on the following day. Forget about the missed dose and simply follow your normal schedule.

If your doctor has prescribed Avandia for use twice a day:

- As soon as you remember the missed dose, take one tablet.
- Take the next dose at the normal time on the same day.
- Don't try to make up a missed dose from the day before.
- You should never take three doses on any single day in order to make up for a missed dose the day before.

### Do I need to test my blood for sugar while using Avandia?

Yes, you should follow your doctor's instructions about your at-home testing schedule.

### Does Avandia cure type 2 diabetes?

Currently there is no cure for diabetes. The only way to avoid the effects of the disease is to maintain good blood sugar control by following your doctor's advice for diet, exercise, weight control, and medication. Avandia, alone or in combination with other antidiabetic drugs (i.e., sulfonylureas or metformin), may improve these other efforts by helping your body make better use of the insulin it already produces.

### Can I take Avandia with other medications?

Avandia has been taken safely by people using other medications, including other antidiabetic medications, birth control pills, warfarin (a blood thinner), Zantac® (ranitidine, an antiulcer product from GlaxoSmithKline), certain heart medications, and some cholesterol-lowering products. You should discuss with your doctor the most appropriate plan for you. If you are taking prescription or over-the-counter products for your diabetes or for conditions other than diabetes, be sure to tell your doctor. Sometimes a patient who is taking two antidiabetic medications each day can become irritable, lightheaded or excessively tired. Tell your doctor if this occurs; your blood sugar levels may be dropping too low, and the dose of your medication may need to be reduced.

### What should I discuss with my doctor before taking Avandia?

Avandia in combination with insulin may increase the risk of serious heart problems. Because of this, talk to your doctor before using Avandia and insulin together. Avandia may cause fluid retention or swelling which could lead to or worsen heart failure, so tell your doctor if you have a history of these conditions. You should also talk to your doctor if you have liver problems, or if you are nursing, pregnant or thinking of becoming pregnant. If you are a premenopausal woman who is not ovulating, you should know that Avandia therapy may result in the resumption of ovulation, which may increase your chances of becoming pregnant. Therefore, you may need to consider birth control options.

### What are the possible side effects of Avandia?

Avandia was generally well tolerated in clinical trials. The most common side effects reported by people taking Avandia were upper respiratory infection (cold-like symptoms) and headache. As with most other diabetes medications, you may experience an increase in weight. You may also experience edema (swelling) and/or anemia (tiredness). If you experience any swelling of your extremities (e.g., legs, ankles) or tiredness, notify your doctor. Talk to your doctor immediately if you experience edema, shortness of breath, an unusually rapid increase in weight, or other symptoms of heart failure.

### Who should not use Avandia?

You should not take Avandia if you are in the later stages of heart failure or if you have active liver disease. The following people should also not take Avandia: People with type 1 diabetes, people who experienced yellowing of the skin with Rezulin® (troglitazone, Parke-Davis), people who are allergic to Avandia or any of its components and people with diabetic ketoacidosis.

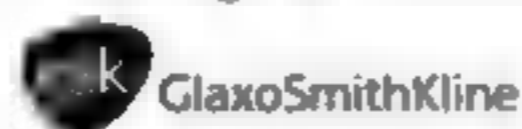
### Why are laboratory tests recommended?

Your doctor may conduct blood tests to measure your blood sugar control. Blood tests to check for serious liver problems should be conducted before starting Avandia, every 2 months during the first year, and periodically thereafter.

It is important that you call your doctor immediately if you experience unexplained symptoms of nausea, vomiting, stomach pain, tiredness, anorexia, dark urine, or yellowing of the skin.

### How should I store Avandia?

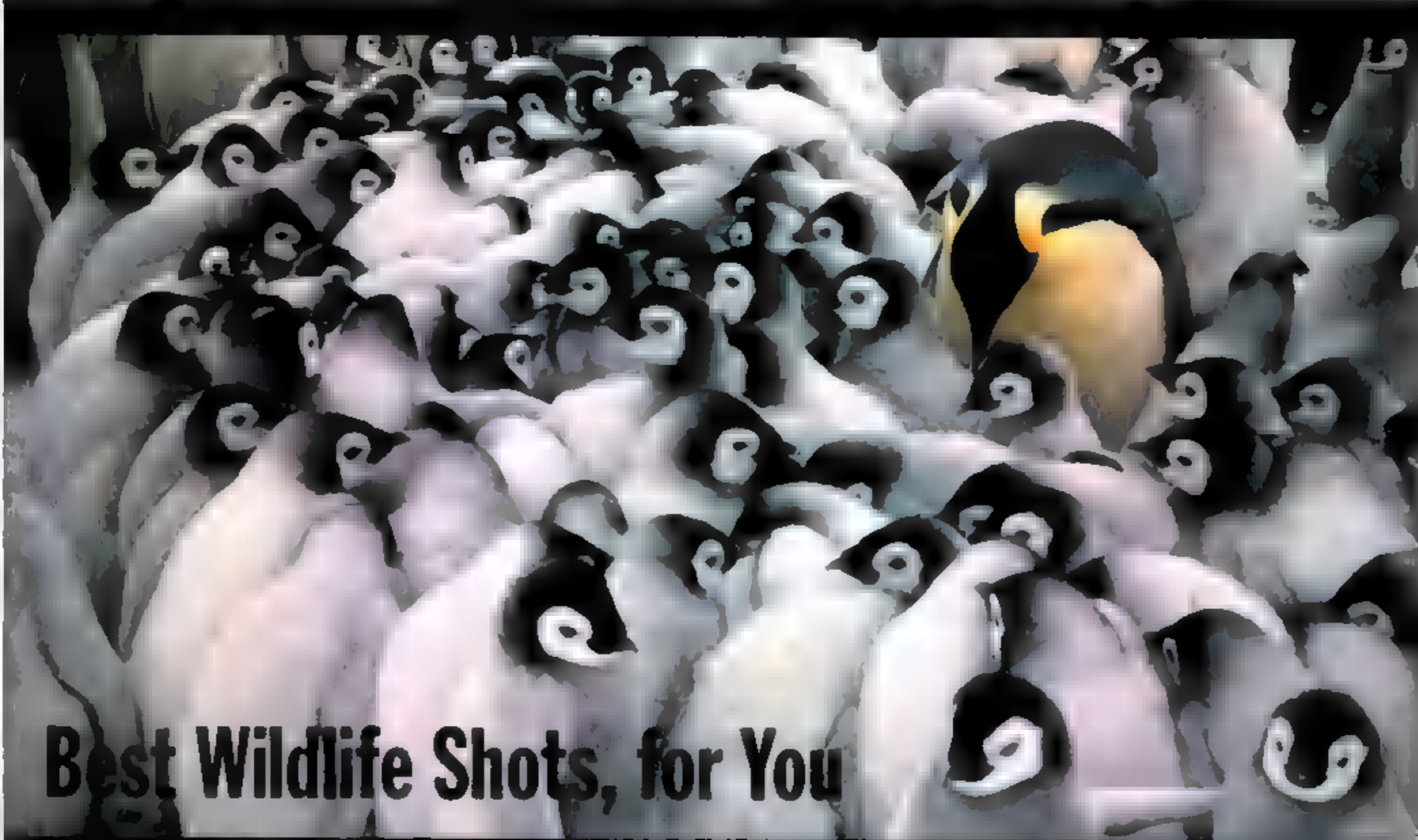
Avandia should be stored at room temperature in a child-proof container out of the reach of children. Store Avandia in its original container.



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2. Drop him off at least a block away.
3. Never, ever kiss him goodbye.

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# National Geographic TV

NATIONAL GEOGRAPHIC

## Phobia



MATTIAS KLUM

A flick, a twitch, a small shriek—that's how most people would react to a spider. But if you're an arachnophobe, you've already quietly turned this page. *Phobia*, a new weekly series, explores how normal, healthy fear turns into paralyzing anxiety. Fear of germs, heights, even clowns: *Phobia* offers case studies in detail, and how phobics learn to confront and overcome their deepest fears.



MICHAEL WOOD

NATIONAL GEOGRAPHIC  
EXPLORER, MSNBC

## Silent Hunters

Don't be fooled by the kindly fairy tale image. Owls are among nature's fiercest predators. Filmmaker Fergus Beeley goes from tundra to desert to see how owls use their keen senses to take prey. *Owls: Silent Hunters* features such raptors as the great gray owl (left), which can target rodents by sound, even if they're under a foot of snow.

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# Who Knew?

## ANATOMY

## All Thumbs

*The cell phone and evolution*

**T**humbs are back. After years of being called “stubby” and doing grunt work on keyboards (the other fingers dance over the keys, the thumb goes clunk, clunk, clunk on the space bar), the thumb is suddenly flying all over the place on cell phones, computer games, and personal digital assistants.

Much publicity greeted a recent study, funded by Motorola, that showed that young people in Japan—heavy users of portable electronics—have developed unusual thumbing powers. They’re even starting to ring doorbells with their thumbs and

point with their thumbs. There are reports of people typing 40 words a minute with thumbs alone.

Does this mean that thumbs are evolving before our eyes? Might thumbs, for example, migrate farther up the side of the hand? Become more pointy? Pivot better?

Behavior precedes anatomy—that seems to be a general rule in evolution. So in theory, a behavioral change could lead to a different kind of thumb. But learned traits aren’t passed on to future generations.

For the thumb to evolve as a result of cell phone use, people whose genetic codes give them unusually nimble thumbs would need to pass along more of their

genes than folks with clumsy, plodding, brutish thumbs. For example, great thumbwork might be considered alluring to potential mates, though the opposite seems more likely. (“Excuse me, darling, I need to make a quick call.”) Or maybe only those with lightning-quick mutant thumbs would be able to call 911 before all the lines get tied up. But again, it seems more likely they’ll remove themselves from the gene pool by making cell phone calls while driving.

Research on thumb evolution looks not to the future but to the past—or at least to our closest living relatives. Although most other primates have opposable thumbs, their thumbs are shorter, farther down on the hand, and their fingers are longer and less straight. To pick up a grain of rice, a chimp may need to squeeze it between its thumb and the side of its index finger, the way a person might hold a key. The human thumb is fingerlike—it’s a precision grasper.

Randy Susman, an anatomist at Stony Brook University, has identified muscles attached to our thumb that other primates lack. For example, there’s the flexor pollicis longus. It runs the length of the forearm and helps control the thumb when you mash something. (Mash a thumbtack into a wall and you’ll feel it tense up.)

The human hand, Susman says, got its current form around two million years ago. But tools came first, he notes—anatomy followed. The very first tools may never be found. “They were no doubt nondurable—sticks, grass stems for termite fishing, and broken nuts for cutting and slicing.”

The cell phones back then, needless to say, were horribly bulky.

—Joel Achenbach

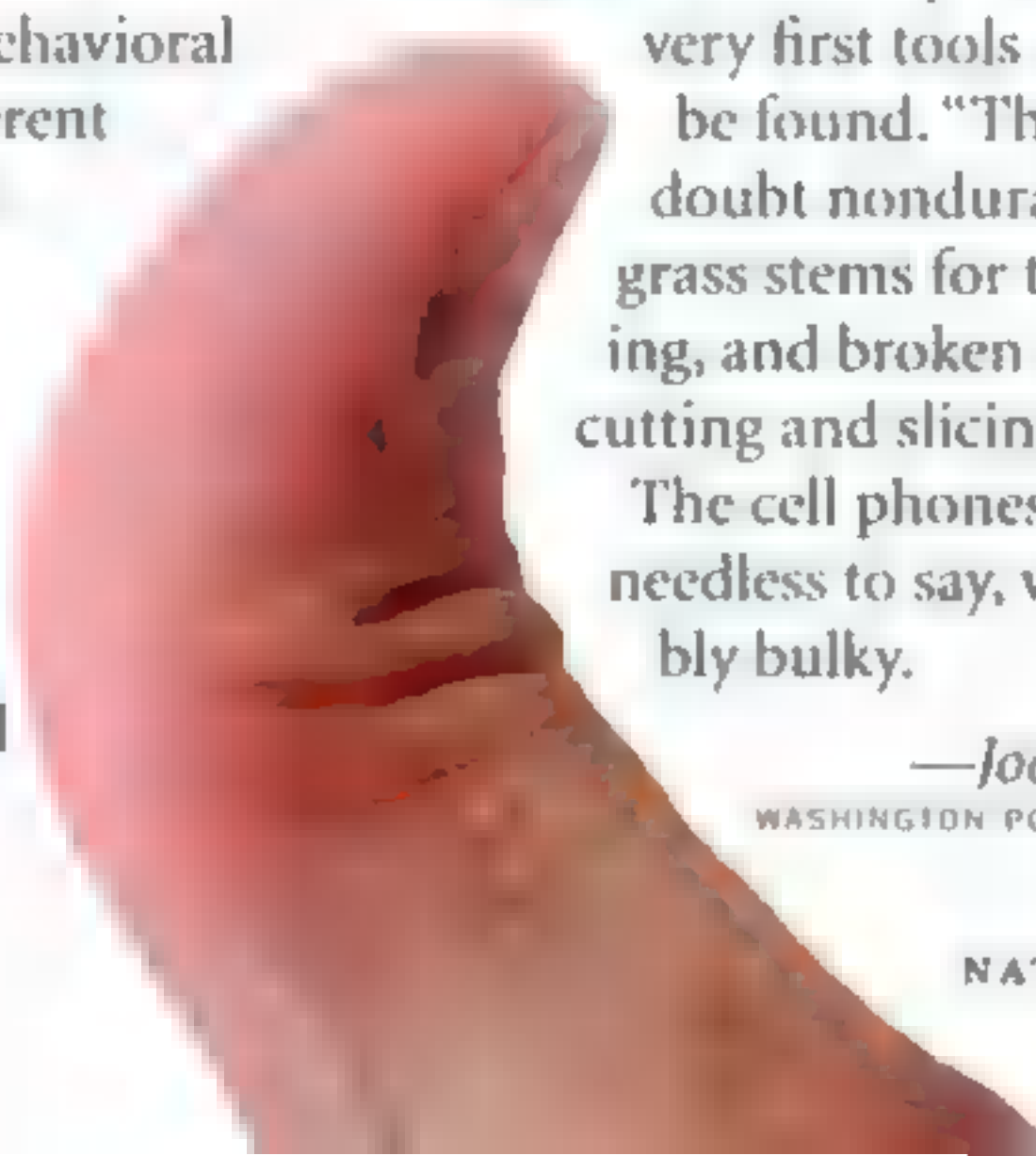
WASHINGTON POST STAFF WRITER

## IT MATTERS

**Tennis champ Serena Williams probably has bigger bones in her racquet-wielding right arm than she does in her left arm.**

Is that weird? Nope, it’s just physiology. As muscles do their work, they exert force against the bones they’re anchored to. The body reacts by building up bone mass to handle the stress. But spend too much time on the couch (especially once you’re past 35), and the minerals that make your bones strong start to dissolve away. It matters that you keep moving. Bone loss (osteoporosis) causes more than 1.5 million fractures in the U.S. every year. Regular weight-bearing exercise (along with getting enough calcium in your diet) is the best defense. You don’t have to win Wimbledon. Just take a walk, climb some stairs, or turn up the radio and dance.

—Lynne Warren



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HAWAII





HONI. *It's an ancient greeting that was almost lost in Hawai'i.*

*Lean forward and look into a person's eyes, a person's soul.*

*Touch foreheads, touch noses, then inhale deeply, sharing the hā,*

*the breath of life. Little more than a century after the U.S.*

*toppled the peaceable kingdom of Hawai'i, sending its culture into a*

*tailspin, honi thrives again as islanders rediscover their Polynesian*


*heritage, using the wisdom and teaching of their elders.*



HAWAIIAN CULTURE  
PRESERVING THE BREATH



LYNN JOHNSON (OVERSAP), RICHARD A. COOKE III

A photograph of two young Hawaiian men performing a hula on the Kaho'olawe coast. They are shirtless and wearing dark shorts, with their arms raised in a traditional hula pose. The background shows a sunset over the ocean with a dark, silhouetted coastline in the distance. The sky is a mix of orange, yellow, and dark blue.

*As their ancestors did for 11 thousand years, young Hawaiians stand on the Kaho'olawe coast at sunset and chant. Once a training ground for native navigators, this remains *wahi pana*, a sacred place. Seized for use as a bombing range in 1941, the island became a focal point in the Hawaiians' struggle to reclaim their culture. After years of protests Kaho'olawe was returned to state control in 1994. Now its restoration is teaching a new generation to be *kahu o ka 'āina* — stewards of the land.*



*A molten fire burns at the center of Kilauea's Pu'u 'Ō'ō crater in Hawai'i Volcanoes National Park. The most active—and accessible—volcano on Earth, Kilauea has been erupting almost continuously since 1983, a fiery show that has destroyed homes, closed highways, and enthralled more than a million park visitors each year.*



By PAUL THEROUX

Photographs by RICHARD A. COOKE III,  
ADRIEL HEISEY, and LYNN JOHNSON

**S**UNRISE IN KEALAKEKUA BAY on the Big Island of Hawai'i filled the deep coastal valley with a watery glow. The rays lighted the Hawaiian double-hulled canoe, *Makali'i*, riding at anchor in the bay. Dawn touched Ka'awaloa Point at the edge of the sea, where Captain Cook was bludgeoned and stabbed to death by indignant Hawaiians in 1779. The slender Cook monument casts a long shadow: It marks the spot where aliens broke into Hawaiian history—for many Hawaiians the most serious assault on a culture that had flourished for more than a thousand years.

Camped onshore on the south curve of Kealakekua Bay, I had been awakened in the predawn darkness by the 19 temporary crew members of the *Makali'i*. They were high school students representing all ethnic groups in Hawai'i, learning Hawaiian values and seamanship on a week-long cruise. The *Makali'i*'s Hawaiian skipper was Clay "Kapena" (Captain) Bertelmann, renowned seaman and veteran of many Pacific crossings in traditional Hawaiian canoes. Now having broken camp, the young crew stood in ranks on the shore, greeting the day with a traditional chant, beginning, *E ala e!* (Awaken! Rise up!) / *Ka lā I ka hikina* (The sun rises from the east) / *I ka moana* (From the ocean) / *Ka moana hohonu* (The ocean's great depths).

As early as the 1820s, not long after the first missionaries arrived from New England, cultural suppression was formalized with the banning of *hula*, because *hula* with its dancing and chanting extolled the Hawaiian gods—among them Kane, the creator; Lono, god of harvests; and Ku, the god of war—regarded by the Christian evangelists as pagan. But *hula* was the heart of Hawaiian culture, an art form

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As spelled in the Hawaiian language, the word Hawai'i (and many others) includes an 'okina, or glottal stop. The mark signals a brief halt.



*The haunting tones of a bamboo flute—played by exhaling through the nose—drift over the edge of Halema'uma'u Crater at dawn as Hawaiian human rights activist Mililani Trask pays homage to Pele, goddess of the volcano.*

that retold the history and the creation myths of the islands. Later, the Hawaiian language was also banned.

By the time Hawai'i gained statehood in 1959, the culture had been seriously eroded. Many Hawaiians were angered by a longtime requirement to prove that they had at least 50 percent Hawaiian blood as a qualification for land grants, leading to agitation in favor of land for all Kanaka Maoli, Original People, no matter how little blood they had. In the new state the language continued to be forbidden in schools, and people were demoralized and sidelined by high crime rates and poor health.

The Hawaiians never lost their voice in the two centuries since the missionaries came ashore, but only in the past two decades have people started paying close attention to them. Today the old term "part Hawaiian" is often



REYNOLD A. GORDON III, CALLIGRAPHY BY JENNIFER WATERS

considered derogatory, and of the 1.2 million people now resident in the islands, nearly 250,000 identify themselves as “native Hawaiian,” wholly or in combination with another ethnic group.

The Hawaiian chant, the pure voice of the Pacific, is one of the most haunting and evocative sounds in the world, partly prayer and partly a dramatic proclamation. The *Makali‘i* crew next chanted “*E Hō Mai*,” which asks for understanding “Of the things and skills that are hidden/Of things Hawaiian.” After that they chanted and stamped out “*E Ala Makali‘i*,” praising their canoe.

With the recital of these chants, they were given the blessing of the local *kupuna*, Gordon Kananui Leslie. *Kupuna*, a lovely word for elder or ancestor, means “emerging from the source,” the source of traditional knowledge.

“Ten thousand Hawaiians greeted Cook here,” Gordon told the young people gathered around him. “The god Lono came from this place—but he was first a man who was made a god. The bay is Kealakekua—Pathway of the Gods. We had to fight to keep developers out of this valley. They wanted to put a luxury resort and golf courses here. Prepare for the future by perpetuating the history.”

After this pep talk the crew bid farewell in the respectful Hawaiian way, not saying *aloha* but exchanging the *hā*, or breath. They lined up and one by one touched foreheads and noses with Gordon, at the same time taking a breath—a ritual that seemed a metaphor for keeping Hawaiian culture alive.

The formalities complete, the crew entered the water, swam a hundred yards out to the canoe, and hoisted (Continued on page 16)

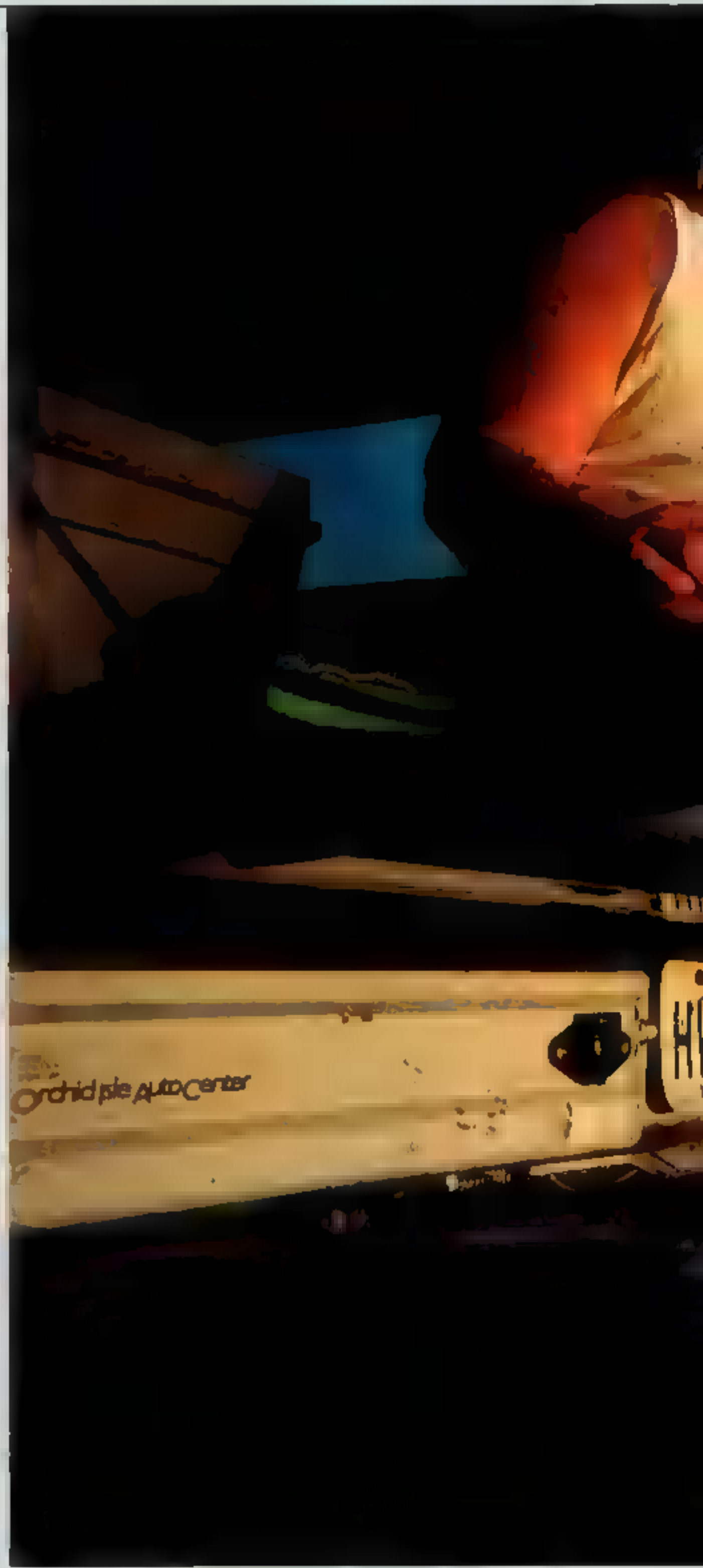
# VOICES

CLAY BERTELMANN

B I G I S L A N D

**T**hey're legends in the islands—guys with gray hair, bare feet, and the uncanny ability to cross thousands of miles of ocean with stars as their only guides. Clay Bertelmann, captain of the voyaging canoe Makali'i, is one of them.

"Hawaiians in my eyes were ocean people," says Bertelmann (right), who now teaches Polynesian seamanship to the next generation (bottom right). "They depended on the ocean for food to survive. To do that, you have to learn how to get



"I REALIZED THAT THE VALUES OF THE CANOE AND THE VALUES THAT I WAS RAISED BY WERE THE SAME. ALL THESE GOOD FEELINGS MADE ME WANT TO COME BACK AND SHARE THAT."

out past the island where you can't see it to get back." Bertelmann learned these lessons from Pius Mau Piailug, a navigator from the Caroline Islands where the skill never died. Piailug guided the first voyaging canoe replica, the 62-foot Hōkūle'a, more than 2,600 miles from Hawai'i to Tahiti in 1976 without charts or instruments—a feat that helped launch the Hawaiian cultural renaissance. Though not aboard that first voyage, Bertelmann later became captain of the Hōkūle'a as well as the Hawai'iloa, the second modern voyaging canoe. Today he guides the newest replica, the 55-foot Makali'i, in which he and his volunteer crew have made their own star-guided voyages to Tahiti, the Marquesas, and other distant isles. It's a family affair for Bertelmann. Brother Shorty, one of Hōkūle'a's original crew and a legend in his own right, navigates. Daughter Pomai and her husband, Chad, help captain, and grandchildren—whose old photo adorns a truck visor (above)—





(LYNN JOHNSON (ALL))



frequently crew. Together they teach students and teachers how to handle the heavy steering paddles (above and right), make fast the mast (below), which carries the traditional crab-claw sail, and work as a team. "We're trying to expose them to something positive," says Bertelmann, "something our ancestors did through thousands of years of migrations. And make them realize they should be proud of who they are."

The plan seems to be working. While native Hawaiian students have the highest truancy and dropout rates in the islands, they can't seem to get enough of the Makali'i, which is booked months in advance for school groups and teacher training sessions. "This was just a dream come true for me," says science teacher Steven Hanaloha Helela (right, in blue). "It's a collective dream of the Hawaiian people. The whole idea of way-finding and navigation is a great metaphor for us as we struggle to revive our culture."



“THE MAKALI’I REPRESENTED A TIME IN OUR CULTURE WHEN EVERYBODY CAME TOGETHER, A TIME OF THANKSGIVING. NO MORE WARS, NO MORE FIGHTING. EVERYTHING WAS JUST PEACE.”

*For Bertelmann the vessel transcends mere metaphor by bringing together all branches of Hawai‘i’s diverse family tree, just as the constellation Pleiades—Makali‘i in Hawaiian—once ushered in a time of family gatherings and peace. “The canoe brings together people from all walks of life and all nationalities,” says Bertelmann. “It makes no difference what color your skin is. Just that we’re working together to make everything work out well.”*

*Bertelmann has no illusions about a quick cure for the islands’ social ills. But he and his volunteer crew keep sailing, keep teaching, keep “talking story.” “It’s not easy, but we have to keep on trying,” he says. “You never know who you are going to touch. Whoever comes and enjoys and feels the way we feel can share the experience with someone else, and it grows that way. It’s a little bit slow, but it grows that way.”*



LYNN JOHNSON (ALL)

the sail for a full day's cruise up the coast to *Makali'i's* home port of Kawaihae. Watching the sail bellying in the wind, Skipper Bertelmann said to me, "This canoe represents family. It's about sharing—history, values, culture, *kuleana* [responsibilities], *kōkua* [help]. Sailing a long distance, the canoe becomes our island. We have to learn to live and work together in harmony. These are values that are translated to land. On land, think 'canoe.'"

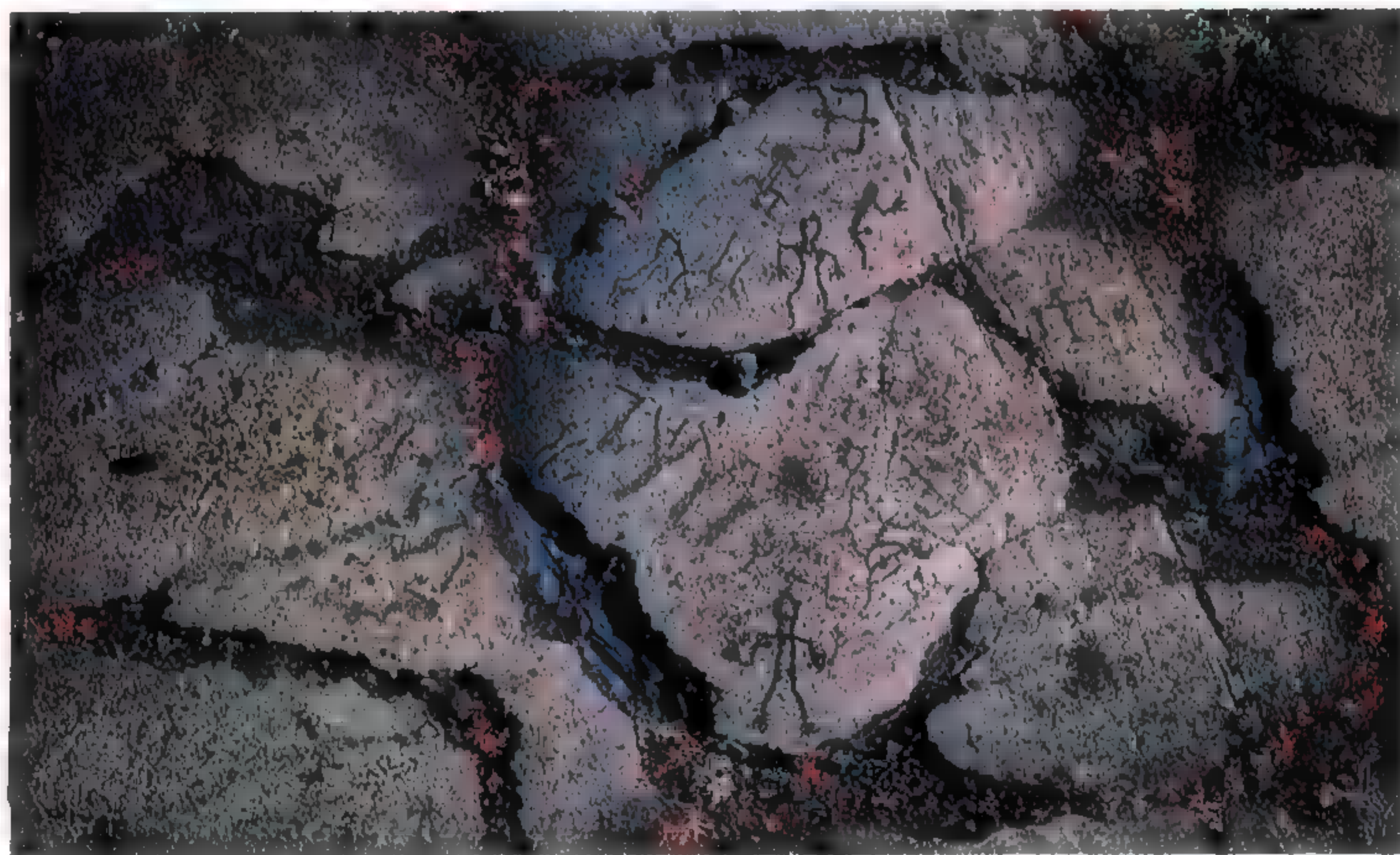


**M**Y SAIL ON THE *MAKALI'I* was a defining moment in my journey into the heart of Hawaiian culture. This coastal voyage designed by Skipper Bertelmann helped me understand how Hawaiian culture has survived against the odds—and indeed has been undergoing a resurgence. I was especially struck by the sight of the greeting and farewell, the *honi*, sanctifying a bond through which a kupuna taught a young Hawaiian a skill or imparted a value. With this I began to grasp the formality in Hawaiian traditional life: the opposite of the breezy, carefree, ukulele-strumming beachboy image or the casual mischief—what Hawaiians call *kolohe*—of the Waikiki entertainer.

Many visitors to Hawai'i see only the beaches of Waikiki or Maui and the superficialities—

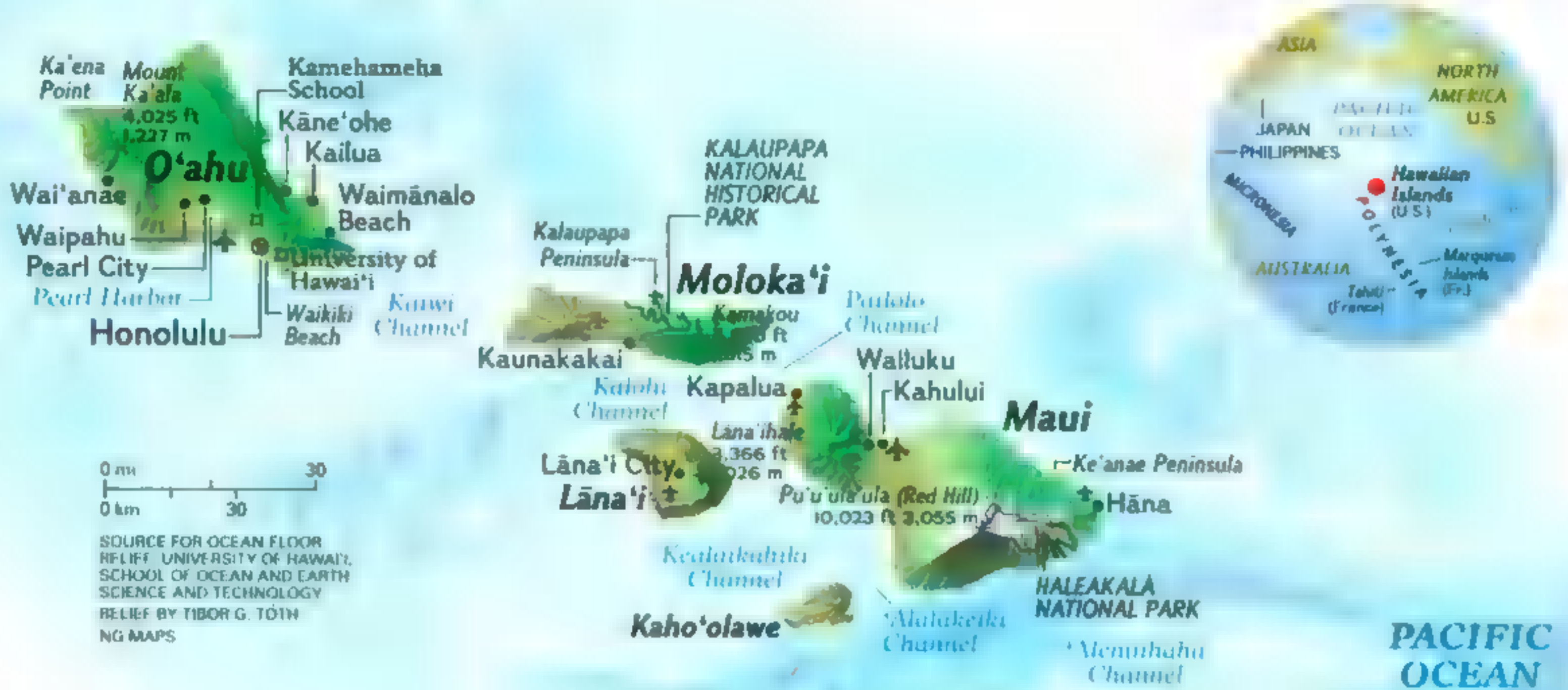
sexy hula, booze cruise, loud *lū'au*—of the visitor industry that drives the state's economy. "Sales and marketing people in Hawai'i invented false concepts like the Big Kahuna or vulgarized the hula," Clifford Nae'ole told me. A respected figure on Maui, Nae'ole works as a Hawaiian cultural adviser at the Ritz-Carlton, Kapalua, educating both staff and guests about, for example, the importance of traditional sacred sites. He said a few luxury hotels have hired people like him "to prevent the further dilution of Hawaiian culture."

At the popular level Hawaiian culture is as hospitable and easygoing as the image promoted by the indestructible musical kitsch of Waikiki's Don Ho. As a Hawaiian, Ho still teaches colorful Hawaiian words in his nightclub act ("Everyone say *lōlō*—it means crazy") along with the verses to "Tiny Bubbles." In the hotel lobby a pretty *wahine* steps forward,



HEISEY

Polynesians began settling this 400-mile-long chain of islands—one of the most geographically isolated archipelagoes on Earth—at least 1,100 years ago. More than 20,000 known archaeological sites predate the first Western contact in 1778, including temples, house sites, fishponds, stone tool quarries, and rock art complexes like the petroglyphs (opposite) at Ki'i on Hawai'i's southeast coast.

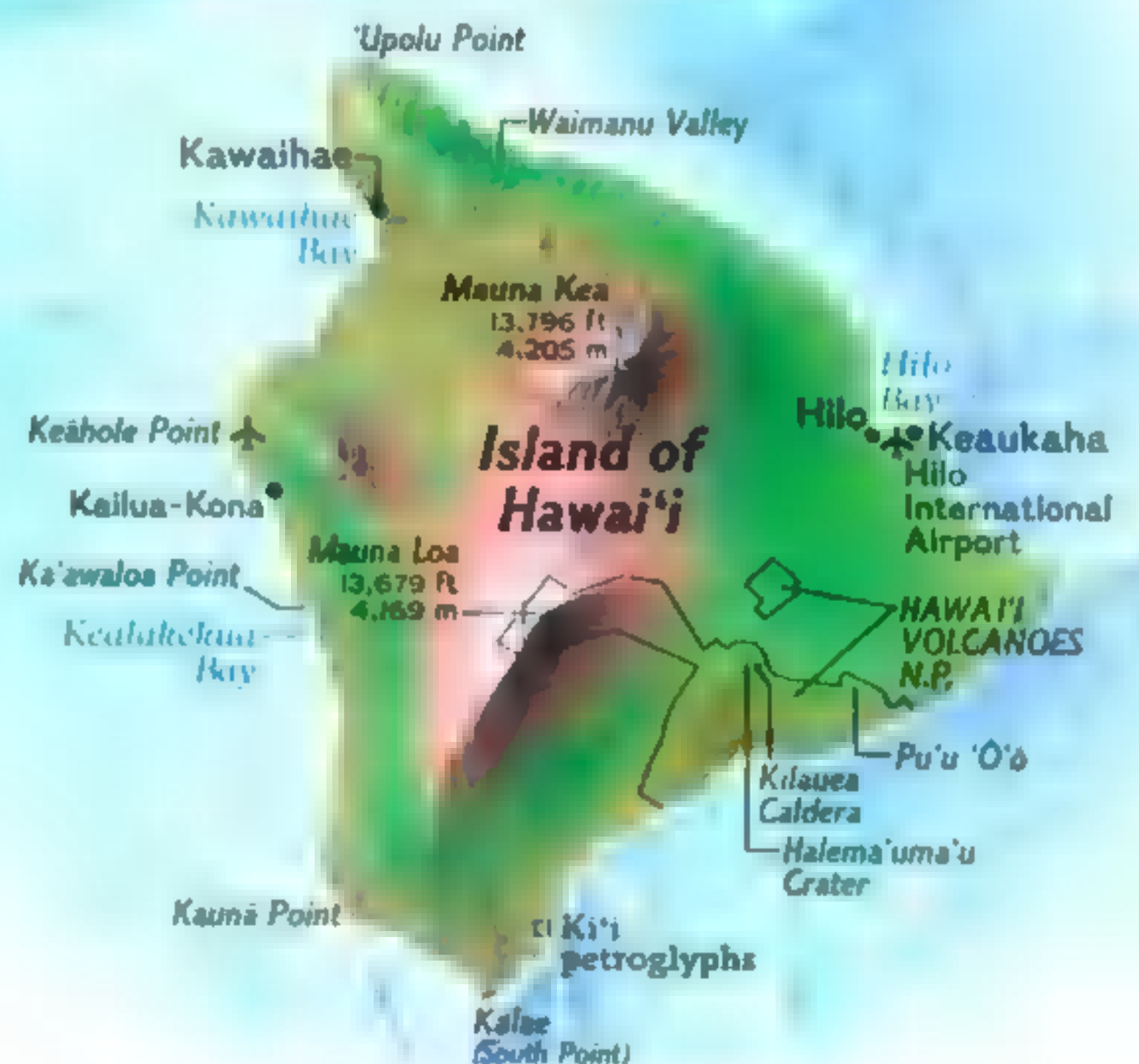


drapes you with a *lei*, and gives you a kiss.

After more than a dozen years wintering in Hawai'i, I still feel the familiarity and warmth that the tourists do. Yet until now I have found the essence of the place elusive. Of course, hula performances—even authentic ones—are available. If you're fortunate, you might even hear two islanders fluently conversing in Hawaiian, a tongue related to Māori and Tahitian, part of the great Polynesian family of languages. You might get a glimpse from shore of a Hawaiian voyaging canoe, with its double hull and crab-claw sail. You will see *he'enalu*, surfing—which Hawaiians began centuries ago.

And you will certainly be aware of an almost incomprehensible outpouring of political activism demanding varying degrees of sovereignty: large demonstrations, sign carrying, infighting, denunciations of an assortment of people ranging from Captain Cook to the present governor.

But you may not know that in traditional Hawaiian society no one visits unannounced or empty-handed, without a gift of some sort, a *pū'olo*. When I first arrived in Hawai'i, I found that if I did not have an introduction, someone to vouch for me, I was dismissed as *nīele*—nosy—and ignored. I now understand



that the heart of the culture is not music or play but an intense solemnity and an appeal to the pantheon of gods in complex protocols of chants and prayers. In this way Hawaiians proclaim and reinforce their powerful connection to the land.

Hawaiinness is also the systematic passing on of language and traditional skills, such as fishing, surfing, voyaging, and growing taro, by a *kumu*, or teacher. Indeed, I find it hard to imagine a culture more organized around teachers and students, more strict in its reverences, and, at its truest, more spiritual.

*Streaks of quicksilver in a tumbling emerald landscape, streams and waterfalls shimmer through the Big Island's isolated Waimanu Valley, fed by more than 150 inches of rain annually. Such lush, windward slopes boast abundant fresh water, but urban development is concentrated in the state's dry, leeward regions, where supplies of groundwater are fast nearing their limits.*



LIFFORD NAE'OLE explained that four main expressions of the Hawaiian cultural renaissance began emerging in the 1970s: "The recovery of the island of Kaho'olawe, the resurfacing of voyaging, the 'Battle of the Bones,' and the revival of traditional hula." And with the hula came a fifth, a new interest in the Hawaiian language.

But the transformation had actually begun earlier. "People were questioning statehood in 1959," Emmett Aluli, physician and community leader on the island of Moloka'i, told me. They objected to greater cultural and political dominance from the mainland—an unwelcome repetition of the events of 1893 when the U.S., pressured by business interests, overthrew the Hawaiian monarchy. In the 1960s the political passion that had begun to transform the rest of the country spilled over to Hawai'i. The civil rights movement, Aluli said, had "people speaking up," helping Hawaiians define the way they saw their place in society. As the rest of the country battled over voter registration and integration, Hawaiians became more active in asserting their claims to land and to a place for their traditional culture. Meanwhile the Vietnam War—and the disillusionment it caused—energized a new generation of Hawaiian activists.

During the late 1970s the small island of Kaho'olawe off Maui's southwestern coast became a symbol of the Hawaiians' struggle to reclaim their culture. Starting in 1941, the U.S. military used Kaho'olawe as a bombing range—this despite the fact that the island is dotted with some 2,000 archaeological sites. The bombing provoked a great deal of Hawaiian anger, sparking protests, demonstrations, and forcible occupation of the island. After a decade of contention that ended in 1990, the state set aside the uninhabited island for the preservation and practice of Hawaiian culture: prayers, chants, and offerings, as well as the

restoration of altars and ancient house sites and a plan to replant native species obliterated by years of bombing.

"It is a *piko* for us," Aluli told me, using the Hawaiian word for navel or center, which indicates Kaho'olawe's importance as a navigational reference point for Polynesian voyagers, who knew the island as Kanaloa, the Hawaiian god of the ocean.

Another force in the resurgence of the culture was the resumption in the 1970s of voyaging in the traditional way, plying the Pacific in double-hulled canoes. The spur was Pius Mau Piailug, a navigator from the island of Satawal, an atoll in the Caroline Islands of Micronesia. Hawaiian voyaging had ended in the 14th century, but seamanship and the ancient methods of reading the stars still existed on remote Pacific islands. Mau reintroduced celestial navigation to Hawai'i through Nainoa Thompson, navigator of the Polynesian Voyaging Society's *Hōkūle'a*, and to Milton "Shorty" Bertelmann, Clay's brother, who teamed with him to create the *Makali'i*.

These men and their canoes became icons, inspiring a new generation. A proud culture of voyaging and navigation has grown up around them, teaching discipline, self-esteem, and seamanship in the sort of cruise I joined on the *Makali'i*.

The so-called Battle of the Bones erupted in the mid-1980s when a Ritz-Carlton hotel and resort was proposed at Honokahua in Maui on a Hawaiian burial ground. Protests against it were so strong that in 1989, after almost a year of negotiation, the planned hotel was moved back from oceanfront to ocean view to preserve the sanctity of the site. The whole affair gave birth to laws to prevent buildings from desecrating ancient Hawaiian sites.

At some point nearly all the Hawaiians I met mentioned how hula had inspired them and reinvigorated their sense of identity. This is not hard to understand. Through gesture and movement and the accompanying music and the

*(Continued on page 24)*

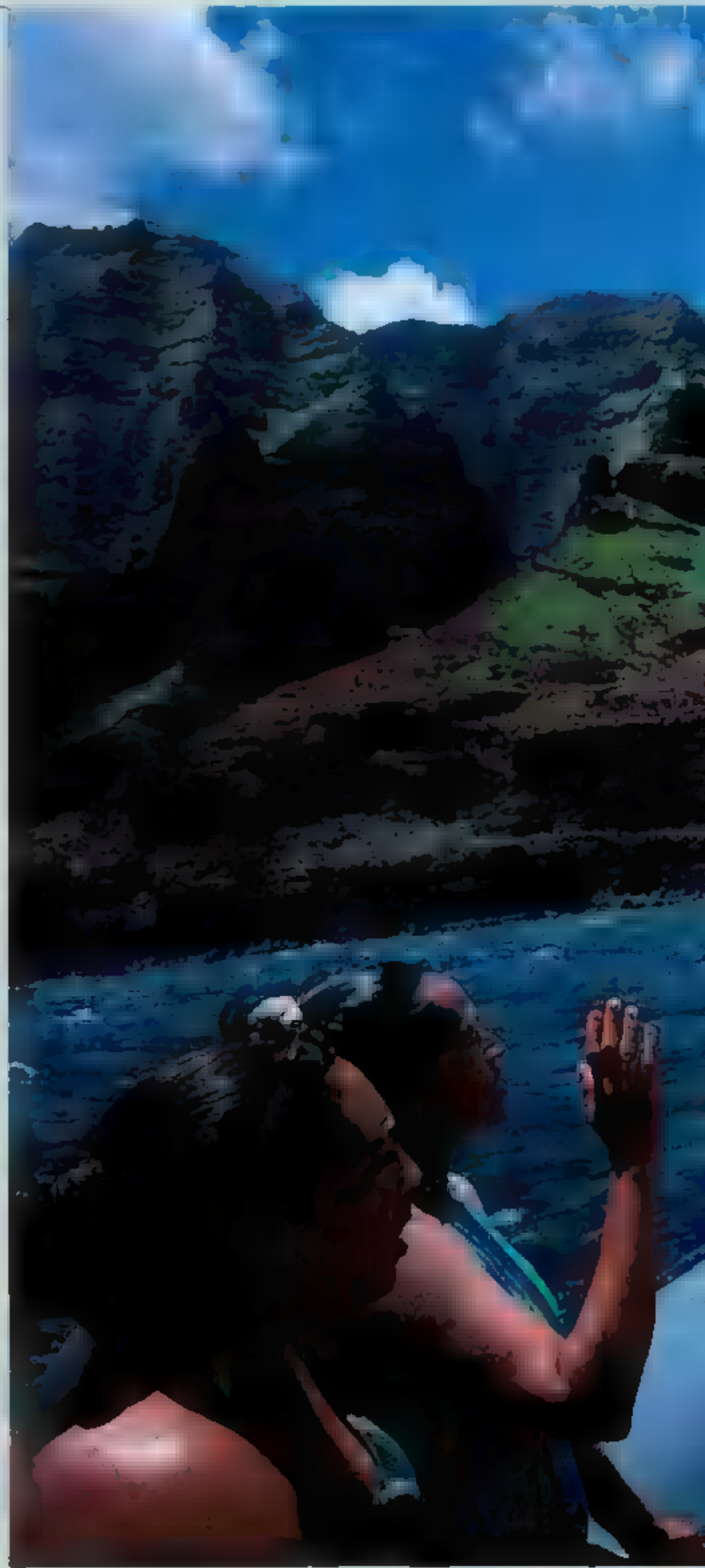


# VOICES

SABRA KAUKA

ISLAND OF KAUAI

**M**ahalo. Respect. That's what Sabra Kauka teaches her Hawaiian studies students. Respect for the kūpuna, or ancestors. Respect for their ways, their songs, their bones. Especially their bones. The journalist-turned-educator provides support for efforts to reinter ancient bones unearthed during a collecting frenzy in the early 1900s and more recently during housing construction and resort development. "There's hardly anyplace to build in the islands



"OUR TRADITIONAL BELIEF IS THAT THE MANA, OR SPIRITUAL POWER, OF A PERSON REMAINS IN THEIR BONES. THE CARE AND POSSESSION OF THOSE BONES WAS VERY IMPORTANT. IT STILL ■ TODAY."

where they will not disturb an ancient settlement or burial," says Kauka. "Our traditional way of burial is to wrap the bones in kapa, or bark cloth [being made at lower right], and then to place them in baskets [above] we make from lauhala, pandanus leaves. We place the baskets in a protective mound of stones." It's easier said than done. Kapa once adorned Hawaiians from the cradle to the grave, but until nine years ago it hadn't been made on Kaua'i for more than a century. Kauka and friends had to recultivate the paper mulberry tree, make their own tools, and relearn the labor-intensive art. But that's all part of mahalo, as is singing an ancient chant of thanks to the Nā Pali cliffs (above right) or cleaning up an old village site nearby. "It's a respect thing," says Kauka, "an acknowledgment of all those who have gone before you. Treating each and every person with aloha, love, and respect is really what we have to offer the world."





LYNN JOHNSON (ALL)



*Graceful as the swaying trees, Sabra Kauka and fellow kūpuna dance and sing for “Uncle” Pepito Makuaole, who lives the old way in remote Makaweli valley with his 33 dogs.*



LYNN

*"In Hawaiian culture the highest compliment you can pay someone is to write a song about them or sing a song for them," says Kauka. "To give them the gift of voice, the gift of life."*



*Circled beneath a sacred peak, students, parents, and staff on Kaua'i chant their thanks for a new cultural immersion school. One of its founders, Kamahalo Ka'uhane (opposite), hopes ancestral wisdom plus modern technology will equal greater success for native Hawaiian children, for whom more typical classrooms have largely failed.*

percussive thumps of slaps on gourds, hula is, variously, storytelling, a way of praising a sunset or a great leader, or a succession of persuasive endearments. It might be performed by one person, or by a whole *hālau*, or company, of stamping, chanting men or sinuous women. In its classic form it is an entertainment as well as a formal way of greeting visitors and a way of praising events and places.

"My introduction to the culture was through hula," Clifford Nae'ole told me, explaining that hula taught not only the Hawaiian language but also history, genealogy, and spirituality. Most of all, he said, because of the necessity for the dancer to understand the Hawaiian identity, hula taught respect for the culture.

"Hula is life," Leimomi Ho told me the day her *hālau* performed at the 39th Merrie Monarch Festival, an annual week-long celebration of hula held in Hilo on the windward side of the Big Island. Leimomi is a *kumu hula*, or hula teacher. Her mother had taught her hula before she could walk, and she had taught her daughter. Leimomi's *hālau* was going to perform a hula that night in praise of King Kalākaua, who reigned from 1874 to 1891 and was called the Merrie Monarch for his exuberant lifestyle and his love of champagne and music. "Kalākaua is known for his interest in the hula," Leimomi said.

At the opening of the festival I talked with George Na'ope, a man in his late 70s, splendid in a wide-brimmed red hat and red shirt and

the many lei bestowed on him by attendees. Uncle George (*kūpuna* are universally called Uncle or Aunty) had helped launch the festival in the early 1960s, when he was director of parks and recreation, to reintroduce the *kahiko*, or ancient hula.

"Kahiko tells of the history of Hawai'i—it's unwritten literature," Uncle George said. It survived in spite of the missionaries "because in the rural areas they were doing it. Tradition stayed alive in the rural areas, not downtown." After almost 40 years the Merrie Monarch Festival has not only brought about a revival of old forms of hula but has seen the emergence of new ones. The *kahiko* is done these days with gusto by groups of 20 or 30 young men or women, and the *'auana*, or modern hula, involves more melodic music and more sensual moves.

Attempts to suppress the hula only made it stronger. In 1964 it was the subject of Gladys Brandt's first cultural battle at Kamehameha School, the largest and most important private school for Hawaiians. Established in 1887, it seeks to admit only children of Hawaiian ancestry. (The acceptance of one *haole*, white, student earlier this year created a furor.) Aunty Gladys, who is 96, is acknowledged as a powerful and respected *kupuna* in Hawai'i. The recently opened Center for Hawaiian Studies at the University of Hawai'i bears her sonorous middle name, Kamaka-kūokalani, which means, literally, the Upright

Eye of Heaven. As principal of the girls' school, she was sensitive to hula because her father wouldn't allow her to perform it—he thought his daughter would be more likely to succeed if she adopted Western culture in place of her own. But she learned the hula anyway.

"There was a rule at the school against girls standing and doing the hula," Aunty Gladys said. "They would sit and use their hands, but they couldn't stand up. When I said they could stand, I was told that the trustees should be given an opportunity to approve of this change." Only one objected. At the thought of swaying bodies, he said, "Woman, when we hired you, we had no idea we were getting someone to promote indecency."

That seems a quaint response now, but she had made her point, and when the girls stood up in their hula, it was considered a triumph. Aunty Gladys had fulfilled her role as a kupuna, and the memory of that early battle is still a source of pride to her.

SINCE FOR MOST of the past three centuries Hawaiian culture has been undermined by the contending cultures of immigrant groups from places such as China, Japan, the Philippines, and, of course, the U.S., it is thanks to people like Gladys Brandt that Hawaiianness still exists at all. "I had always felt to be Hawaiian was junk," she said. "I felt there was a society beyond my reach and that a lot of doors were closed to me." But, she went on, "I stopped thinking it was junk to be Hawaiian when I became principal." At Kamehameha School, in addition to putting girls on their feet to do the hula, Aunty Gladys promoted awareness of music and other facets of Hawaiian culture.

Morning assembly at a school in Keaukaha provides further evidence of the new vigor of the culture. The school is unusual in that two different schools operate under the same roof: Keaukaha Elementary School, where



LYNN JOHNSON (BOTH)

classes are taught in English, and Ka'Umeke Ka'eo, a charter school in which classes are conducted in Hawaiian. Until relatively recently—the early 1980s—Hawaiian had neither been spoken nor taught in schools except in a guarded and experimental way.

I found it was not just language that set the charter school apart but rather a whole system of traditional Hawaiian courtesies. The English-speaking section began with morning assembly, announcements, and the casual filing into classrooms. As this was happening, elsewhere the Hawaiian students were standing before their teachers, reciting some of the same chants I heard in Kealakekua Bay, greeting the day, greeting the teachers, appealing for wisdom, asking to be admitted into the classrooms. The teachers answered the chants, and with the chanted replies the whole ceremony of greeting and permission—up to 12 minutes of chanting, singing, and affirming—lasted long after classes were under way on the English side. The same ceremony is held to close the day.

Wendy Mapuana Waipa, who lives a short walk from the school, is a modest embodiment of the cultural revival that has occurred since the introduction of Hawaiian as the medium of instruction. "The language became an issue," she told me at a community meeting. "We felt, 'If we don't do something, the language is going to die out. The kūpuna are dying out.'" Mapuana had been raised as an English

# VOICES

ERIC ENOS

ISLAND OF O'AHU

**C**an Hawaiian culture defeat the drug culture? Eric Enos thinks so. Co-founder of the Cultural Learning Center at Ka'ala Farm, Inc., in the troubled Wai'anae Valley—where crystal methamphetamine seems as common as fast food—Enos has spent the past 30 years trying to instill pono, the ancient Hawaiian concept of balance, back into his community. “You have to start with your relationship to the earth, and the earth has to be healthy,” says Enos, who drives past a



“ALL OF THIS IS BASED ON THE CONCEPT OF PONO.

IT'S FOUND IN OUR STATE MOTTO: *UA MAU KE EA O KA 'ĀINA I KA PONO.*

THE LIFE OF THE LAND IS PERPETUATED IN RIGHTEOUSNESS.”

former drug hangout (above) on his way to the farm every day. “We try to teach Hawaiian values—taking care of your kūpuna, and that traditional knowledge is good. That knowledge ties us back to the earth.” For the students, ex-cons, and recovering addicts who visit Ka'ala that means performing morning pule, or prayer (above right), planting kalo or taro, and listening to mo'olelo, traditional Hawaiian stories. “Basically learning how to mālama ka 'āina,” says Jessica Villiarimo, a recovering addict who works on the farm. “That means to take care of the 'āina, or land, and the 'āina will take care of you.”

Enos's latest project extends that philosophy to the sea by building the first wa'a 'ōpelu, a traditional dugout fishing canoe (right), to be hewn in Wai'anae in generations. “We don't have all the answers,” he says, “but if we have the correct attitude and spiritual connection, our solutions will be pono—balanced and correct.”



LYNN JOHNSON (ALL)

*Reducing massive Pacific Ocean breakers to a scant rime of foam, immense sea cliffs—the tallest in the world—can rise as high as 3,000 feet along a 15-mile stretch of Moloka'i's north shore. Native Hawaiians predominate on this still largely rural island, where population density is one-fiftieth that on O'ahu, and per capita income is among the lowest in the state.*

speaker, but when her young daughter entered the immersion program, she began to learn Hawaiian herself. "She was my inspiration."

Mapuana's community of Keaukaha, home to roughly 1,400 native Hawaiians and adjacent to Hilo International Airport, is now celebrating its 78th anniversary as the second oldest of the state's 67 Hawaiian home lands. Under current law anyone who is at least half Hawaiian is entitled to a piece of land, a house lot, or a number of acres, depending on whether the location is urban or rural. Hawaiians with less than 50 percent Hawaiian blood—by far the majority—don't qualify, and some regard the restriction as unfair.

Having to prove Hawaiianness through blood dates back to the Hawaiian Homes Commission Act of 1920, which was designed to return ceded land to qualified people. But the process of granting land is so bureaucratic that many on the waiting list die before ever being resettled. Even after all this time, the Hawaiian home lands support a population of only 22,500.

**H**AWAIIANS WIDELY REGARD the blood requirement as irrelevant. For most the slightest tincture of blood (*koko*) is enough to identify a person as a native islander.

The bumper sticker "Got Koko?" is a simple emblem for a complex issue: Hawaiian sovereignty. By one estimation there are nine different sovereignty groups, with a combined membership of some 48,000—about a fifth of all native Hawaiians. No one knows the exact number of sovereignty groups because they tend to be schismatic and splinter prone. Some are conciliatory, lobbying for nation-within-a-nation status, much as some Native American groups have managed to be enclosed entities on the mainland. Others demand nothing less than total independence: secession from the United States, limiting full citizenship only to those of Hawaiian ancestry, and

deleting the 50th star from the American flag.

In 1998 one group enthroned a Hawaiian monarch at Iolani Palace in downtown Honolulu: His Royal Majesty 'Akahi Nui, great-grandnephew of Queen Lili'uokalani, who has already issued an orotund proclamation, beginning, "I, Majesty 'Akahi Nui, Ali'i Nui and Sovereign Heir to the Crown and Throne of the Kingdom of Hawai'i, being a Sovereign Nation of God, Am Now, on behalf of the Almighty Creator, restoring His Sovereign Nation once again."

A few weeks after my visit to Keaukaha, I was walking down a back road in Hilo and saw a banner waving over a large open tent proclaiming "The Lawful Kingdom of Hawai'i." That was how I bumped into Sam Kaleleiki, one of the friendliest Hawaiians I met during my travels; he was also, in his way, the most intransigent.

"I am not an American," he said. Although he had served in the U.S. Marines for 32 years, he said he doesn't pay taxes, doesn't vote, and doesn't recognize the U.S. government as having a legal claim on Hawai'i. Hawai'i's queen, Lili'uokalani, had been overthrown and imprisoned in 1893 at the instigation of a group of American businessmen, he said, and the islands illegally annexed in 1898; they were overdue for return to their native people, as had happened in Zimbabwe and India and elsewhere. "Hawai'i is not America," Sam told me. "We are not Native Americans. We are Kanaka Maoli."

On September 11, 2001, Sam was in Las Vegas at a reunion of his Marine buddies when news came of the tragedies in New York, Washington, D.C., and rural Pennsylvania. Much to the dismay of his buddies, Sam—who has a silver Marine Corps insignia inlaid in a front tooth—left the room rather than salute the flag or sing "God Bless America." To calm them, he said, "I'm a Hawaiian."

Sam is an island organizer for the Big Island and one of 24 elected representatives of the Lawful Kingdom (Continued on page 34)





# VOICES

## ALI'ILOA & KEHAU ISLAND OF MAUI

*“Our little distraction,” says Sommer Kehau Kimokeo of her two-month-old daughter, ‘Ale‘a (below and right). “She has tickle spots on her legs, and when she giggles, it’s really cute.” Such laughter is a welcome diversion for Kehau, 23, and her husband Ali‘iloa, 26, who are struggling to live as close to a traditional lifestyle as they can—no easy feat on Maui, the playground of the rich and famous. But with the help of ‘ohana, their extended and supportive*



*“MY FRIENDS ARE AMAZED. SOME ARE STILL GOING TO SCHOOL, STILL FIGURING OUT WHAT THEY WANT TO DO, AND I’M OUT HERE WITH MY HUSBAND WORKING IN THE TARO PATCHES.”*

*family, they are making it work, tending the same lo‘i, or taro patches, that Ali‘iloa’s parents, grandparents, and ancestors tended on the Ke‘anae Peninsula.*

*It’s a labor of love, and a lot of hand labor at that: planting, weeding, harvesting, and scraping the cooked taro before grinding it into paste-like poi, which they share with family and friends. Even brother Kealoha, age ten, nephews Kaimalu, five, and Koali‘i, four, pitch in, stomping in the mud and trimming ti plants around the lo‘i (right). “It’s probably the hardest path we could have chosen,” says Kehau. “But when we first met, Ali‘iloa was living traditionally, following his ancestors. I wanted to support him because I saw how much he loved it. He was living the culture, and you don’t see that in a lot of people today. Especially people our age. They’re working regular eight-hour jobs to survive in today’s society.”*

*Ali‘iloa and Kehau, who live with his parents, have to stay busy just to stay afloat.*



LYNN (ALL)



“I HOPE SHE GOES TO COLLEGE. BUT I DON’T WANT HER TO FORGET HER CULTURE. I WANT HER TO KNOW SHE CAN SURVIVE BY LIVING OFF THE LAND. NOT JUST TALK ABOUT IT, BUT GET HER INTO THE MUD.”

*Kehau works as a ranger at Haleakalā National Park, almost a two-hour drive away. Ali’iloa works for a local nonprofit group fighting to retain the area’s vital water supplies, which are rapidly being tapped by large commercial farms and resorts on the drier side of the island. As tourists in rental cars fly past his house on the spectacular Hana Highway (below), Ali’iloa harvests red ginger to sell for the cause. A skilled waterman, he also gathers ‘opihi, a type of limpet, from rocks in the surf (top left) and spears various reef fish to supplement their table fare.*

*“East Maui, where we live, is one of the greatest rain forests on Maui,” says Ali’iloa. “But*



LYNN JOHNSON

*they are taking all the water and sending it to town to feed all the hotels. Right now the rivers are not really running. All the tourists come in and ask, ‘Hey, where are all the waterfalls?’ But there are no waterfalls, because all the water is going to town.” The flow in their local stream is now so low that they have to alternate watering the lo’i, which are normally flooded most of the year.*

*Yet despite the hard work, the Kimokeos wouldn’t do it any other way. “When we’re making the poi [left] or working in the taro patches, that’s our real quality time together,” says Kehau. “Throughout my pregnancy I was working in the taro patches right next to Ali’iloa and it was really what kept our relationship strong, because it gave us that time to be together and be a family.” That’s the true meaning of ‘ohana, says Kehau. “You make sacrifices, yet as long as there is love in the family, it works out fine.”*

of Hawai'i, which has about 3,000 members. He is also active in Na Kupuna O Hawai'i Nei, a kūpuna council on the Big Island. Each island has one of these traditional governing bodies, made up of 30 to 70 self-selected elders who embody a deference to older people. They serve, unpaid, for life, and occupying common ground, they find a consensus where Hawaiian interests are involved, especially in the matter of sovereignty.

Sam did one tour in Korea and three in Vietnam and was decorated for bravery. Genial and hospitable to me, he was willing to talk for hours and seemed the most American of veterans. But he insisted that nowadays he was anything but.

Twenty years ago Sam had a conversion after he returned from more than three decades on the mainland. "I found my people destitute, living in tents. I asked them, 'What are you doing out here?' They said, 'My landlord raised the rent.'"

I asked him what he envisioned for his people. He said, "The restoration of the Kingdom of Hawai'i."

"When is this likely to take place?"

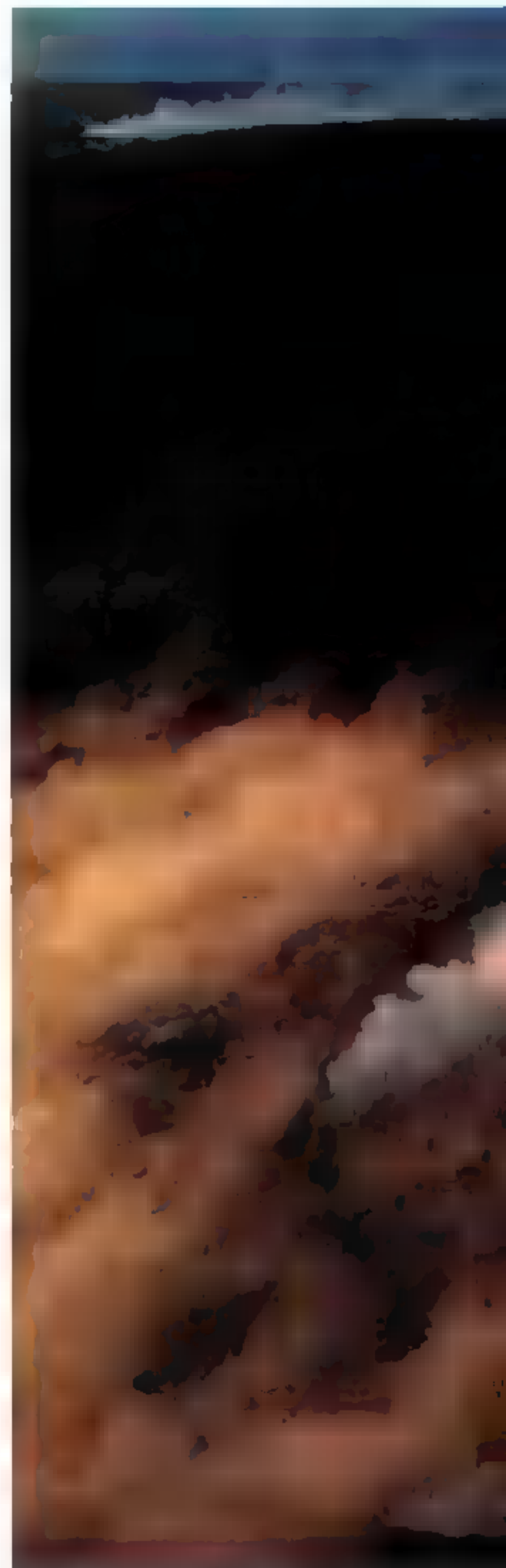
The process had already started, he insisted. "In March 1999 we formed a pro tem government and reinstated the lawful Hawaiian government. The Lawful Kingdom of Hawai'i has a legislature. We have a prime minister, Henry Noa, who is guiding us, using international law. *The Law of Nations* treatise gives the smallest nation in the world the same authority as the biggest nation. We're going back to where we were in 1893—an independent country. The Kingdom of Hawai'i, with the 1887 constitution, with Hawaiians as full citizens."

"Who is a Hawaiian then?"

"Anyone with any Hawaiian blood. If you have one percent, you have the perfect right." And if you have none, even if you're the tenth generation of a family of missionaries or planters or field hands, you have no status at all in the eyes of some Hawaiian sovereignty groups.

Hearing Uncle Sam's drill-sergeant peroration, it is easy to write him off as a dreamer or a crank. After all, though he counts as a kupuna, he is apparently just a likeable agitator in a tent strung with banners by the side of a road outside Hilo. But professor Lilikala Kame'eleihwaha, as director of the

*Blown into ground-hugging streamers by trade winds from the northeast, plumes of water vapor, carbon dioxide, and as much as 2,000 tons of sulfur dioxide gas a day vent from Kīlauea's rift zone. Reacting with sunlight, oxygen, and dust, these emissions produce volcanic smog—vog—that can interfere with breathing, generate acid rain, and spread a hazy pall over much of the Big Island.*



Center for Hawaiian Studies, occupies a powerful position in a multimillion-dollar building on the Manoa campus of the University of Hawai'i. "Our mission is that the knowledge of the ancestors should never die," she says. And, giving voice to the notion that culture in Hawai'i has profoundly political implications, she adds, "We will never give up our quest for sovereignty. We want our country back."

**I**N ITS MOST INTENSE FORMS, Hawaiian culture is found in places visitors seldom see. One of these, about 45 minutes from Waikīkī, is Wai'anae, at the foot of O'ahu's highest peak, Mount Ka'ala. The sight of homeless people camped on the beach, streets of substandard housing, and a reputation for xenophobia,



ADRIEL HEISEY

drugs, and crime have tended to deter visitors. Yet Wai'anae has the sunniest, prettiest beaches on O'ahu, sweeping westward toward Ka'ena Point, where Laysan albatrosses nest on the ground; it has the deepest valleys and some of the most hospitable people. I arrived there at roughly the same time as a prized 30-foot log of *koa* hardwood, sent by Hawaiian well-wishers on the Big Island. The log was destined to become a 20-foot outrigger craft, a traditional fishing canoe.

"This is the first time in 150 years that a *koa* fishing canoe like this will be made in Wai'anae," said Eric Enos, director of the Wai'anae community group Ka'ala Farm, Inc. He added that a century ago there had been trees this size growing all over Wai'anae, but they were cut down by sugar planters who cleared the land for cane fields.

"We're building a community as much as a canoe," Enos said. Working on the canoe would be a constructive, unifying activity that would also teach the Hawaiian youth something of their history. He said it might take a year and that hundreds of people would be involved—mainly high school students but also Wai'anae families, as well as the people, mainly Hawaiian, from local foster homes in the Adolescent Day Treatment Program and the Wai'anae rehabilitation centers, who are recovering from alcohol and substance abuse.

Ka'ala Farm is high above the beach in Wai'anae Valley. Leased from the state, the land proved to be rich in ancient habitations—including many taro terraces, known as *lo'i*. Over the years these terraces have been unearthed and replanted. *(Continued on page 40)*







*Lu'au centerpiece, a roast pig will be served moist and fragrant from its leaf wrapping. With such feasts Hawaiians celebrate weddings, graduations, new babies. To their ancestors, says University of Hawai'i professor Liholihi Kame'eleihwaha, "generosity in all things, especially in sharing food, was the highest mark of civilized behavior."*

# VOICES

PUNA DAWSON

ISLAND OF KAUAI

**S**ome people are born movers and shakers, and Puna Dawson, a kumu hula, or hula master, in the spiritual enclave of Anahola, is one of the best. Whether teaching hula on the beach, working at a food bank in Lihu'e (below), or bestowing a traditional blessing on a condo in tony Princeville (bottom right), Dawson exudes aloha. Her philosophy manifests itself in kahiko, the traditional form of Hawaiian dance. "Hula is really a prayer, a visual expression of one



"THE MOVEMENT OF OUR BODIES IS REALLY THE MOVEMENT OF NATURE. MY HAND TOUCHES THE HEAVENS AND MY FEET TOUCH EARTH. WE DANCE THE GEOMETRY OF BOTH PLACES."

thought," says Dawson. "In the kahiko, we are a double-hulled canoe [top right]. There is ākau, the right side, and hema, the left side, and ahu, the center that holds things together. Our hands pull the best of the past and bring it into the future." Bridging cultures is never easy. Rising property taxes and unemployment are pushing island-born elders and young people off the island, while wealthy retirees are moving in. At house blessings Dawson welcomes newcomers but stresses their new responsibilities. "Everyone says aloha, but I don't know how many really know what it means. Each letter has its own thought. The first is akahai, to be kind. The second is lokahi, to be inclusive. The third is olu'olu, to be agreeable. Ha'aha'a is the fourth, to be humble. Ahonui is the last and means patience. These are the characteristics of Hawaiian people. By itself, alo is space and breath is hā. So when you say aloha you say come, share my space, share my breath. That's aloha."



LYNN JOHNSON (ALL)



Enos's community-building strategy was simple enough in theory. First it was to teach traditional values of *pono* (righteousness), self-respect, knowledge of Hawaiian history, and care for the environment.

To this end Ka'ala has begun a program of reforestation and the replanting of traditional species. In the nursery Enos showed me an array of cuttings, many of them "canoe plants"—species brought here by the Polynesians who settled the islands. Considered essential by Hawaiians for their well-being, canoe plants include various types of taro, from which the Hawaiian staple food, *poi*, is made and such a key plant that it is part of their creation mythology; the *wauke*, or paper mulberry, which was made into bark cloth; the 'awa, or kava, which was made into a ceremonial drink and is still used for medicinal purposes;

and the *kukui* (candlenut), *mai'a* (banana), *niu* (coconut palm), 'awapuhi (wild ginger), 'uala (sweet potato), and 'ulu (breadfruit).

Explaining his philosophy in a simple motto, Enos says, "Plan for a year and plant taro. Plan for ten years and plant koa. Plan for ■ hundred years and teach the children *aloha 'āina*"—to love the land.

Early one morning at Ka'ala, I watched while a visiting group from a local rehab center stood and chanted a greeting. Reciprocating with the Ka'ala chant was Butch DeTroye, chanting 18 verses in welcome, beginning, *E mai, e mai, e kipa mai i ke awa-wa o Wai'anae-kai* (Come, come, welcome to Wai'anae-kai Valley).

Although originally from Wisconsin, DeTroye is Hawaiian, by marriage, in his ability to chant, in his spirit and sympathy, and



RICHARD A. [unreadable] III

*An ahu, or altar, caps the highest point on Kaho'olawe, beckoning rain clouds from nearby Maui. A lodestone for ancient voyagers as well as the Hawaiian renaissance, this bomb-blasted island has captivated the imaginations of elders and children alike. Some even say Hawai'i's youth are the prophesied seventh generation—those who will recapture the knowledge of the Ka Po'e Kahiko, the People of Old.*

in his dedication to the revival of native culture. His 25 years in Wai'anae have given him the authority of experience.

DeTroye and Enos reminded the nine youngsters that smoking and lazing around are not allowed and got them busy clearing brush and building the stone foundation for a small house site. I saw further proof of a comment DeTroye had made (“the Wai'anae Valley is a vortex of energy of Hawaiian culture”) a week later at the blessing of a new center for alternative health in Wai'anae. The Wai'anae Coast Comprehensive Health Center was celebrating its 30th anniversary, and the new enterprise would enlarge its scope with a Hawaiian dimension—herbal cures, ancient methods of massage, and traditional healing techniques.

One of those present was Terry Shintani, a physician and Harvard-trained nutritionist

who has been instrumental in reviving interest in the traditional Hawaiian diet. His book *HawaiiDiet* has sold in large numbers, the proceeds going to Hawaiian health organizations. Shintani's theory is that the old Hawaiian diet based on fish, fruit, and unrefined and unprocessed carbohydrates such as taro is inherently healthier than what most people eat now.

Shintani said his diet was much more than an aesthetic exercise in cultural awareness: One-third of Hawaiians die of heart disease, a quarter of them from cancer—just about the national average. Because many Hawaiians possess the “thrifty gene” (allowing them to retain calories and survive famine and food deprivation), they suffer obesity more than many other people, and diabetes has increased 50 percent since 1959.

“We've proved my hypothesis that the people on the traditional diet would do better,” Shintani said. “Cholesterol went down, weight went down, blood pressure was improved. We had diabetics who got off insulin as a result of the diet.”

I watched with Shintani while the *kahu*, or priest, led the blessing of the center. Of Japanese ancestry, Shintani is not Hawaiian by blood but in attitude and belief, having been raised under *hānai*, the traditional system of adoption, by his foster mother, the kupuna Auntie Agnes Cope. He seemed to me a perfect illustration of what could be accomplished in Hawai'i in a spirit of peacemaking. As Eric Enos had said, “Under the *hānai* system you become part of the *'ohana*, the extended family. We don't ask who people are. Everyone is welcome here if they're willing to work.”

Everyone is welcome here if they're willing to work.”

In the front row of the blessing were four kūpuna, seated under an awning, saying nothing, smiling benignly. “If you have the kūpuna on your side you can move the community,” Shintani said. “They need to be there at the beginning.” □

#### **MORE INFORMATION**

**ONLINE EXTRAS:** Enter the soul of Hawai'i through Sights ■ Sounds, a photo gallery, and field notes. Find a full set of links. And say aloha to a friend with ■ island e-greeting at [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).

**NATIONAL GEOGRAPHIC TRAVELER:** See “Insider's Hawaii” in the November/December issue—tips on the islands' best scenic and cultural attractions along with great places to eat and stay.



S U P E R  
X - R A Y  
V I S I O N

CHANDRA, NASA'S  
ORBITING X-RAY  
OBSERVATORY,  
SPIES A VIOLENT,  
ROILING UNIVERSE

BY MICHAEL KENNEDY  
NATIONAL GEOGRAPHIC WRITER



NASA/DANIEL WANG, MIT OF MASSACHUSETTS

## THE CENTER OF THE MILKY WAY GALAXY

blazes in this x-ray mosaic 900 light-years across. Our galactic center is a turbulent region, 25,000 light-years from Earth, packed with

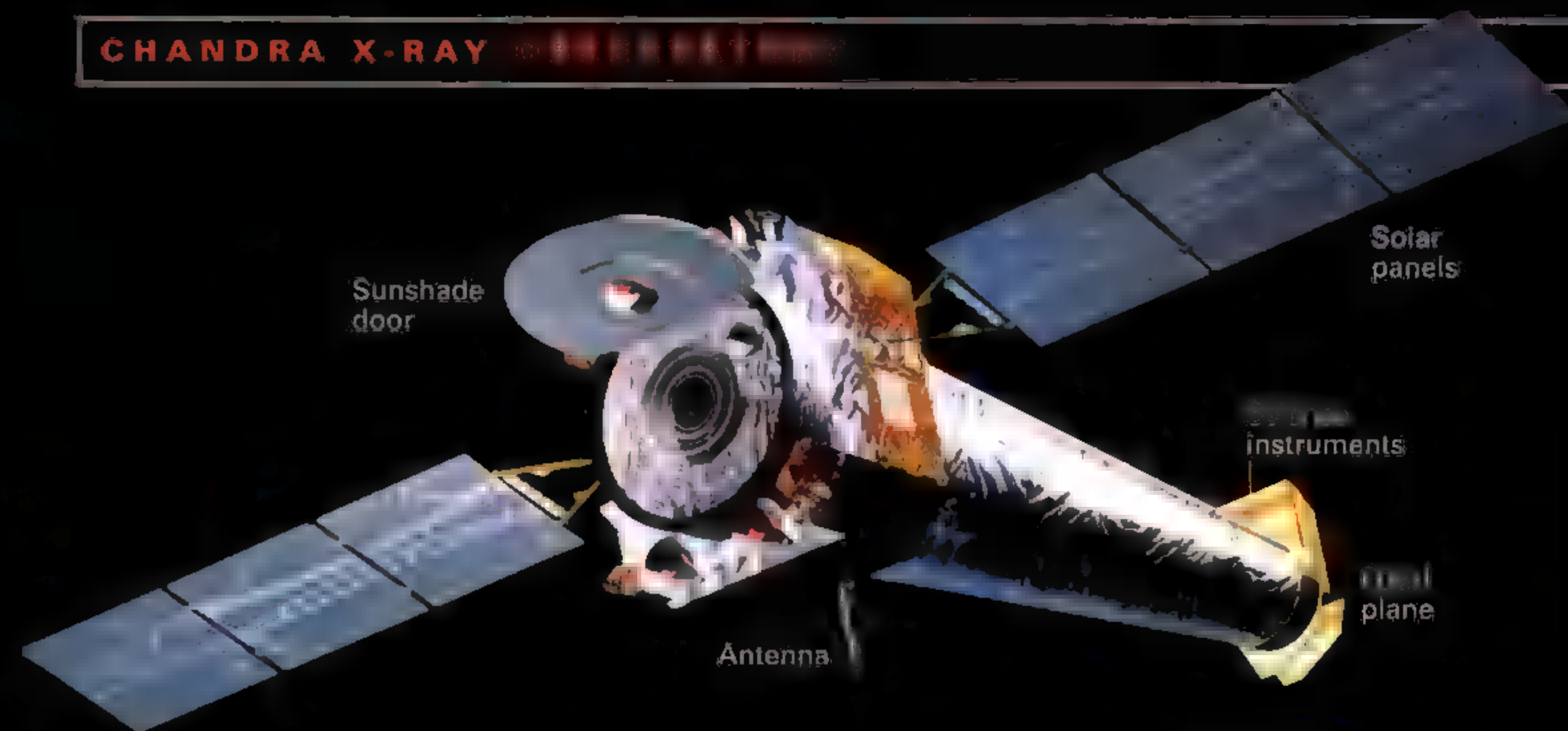
black holes, white dwarfs, neutron stars, and supernovae in a sea of multi-million-degree gas. Chandra's x-ray eyes show—for the first time with such

clarity—the interplay between stars, gas, and dust. By detecting high-energy radiation, Chandra offers new perspectives on a clandestine universe.

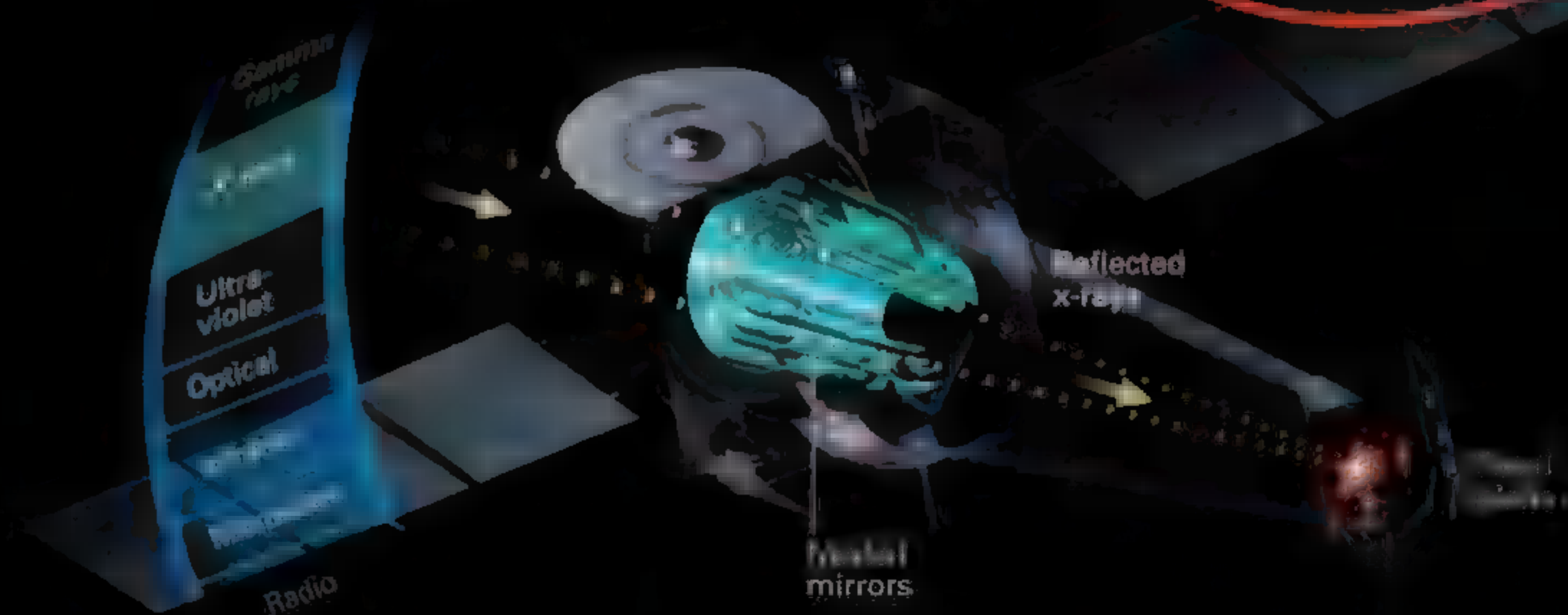
**C** Unlike from the view of a stranger on Earth, **H** the x-rays that reveal the most violent events in the universe find simple home with Chandra. The Chandra X-ray Observatory, named for **A** **A**stronomer Subrahmanyan Chandrasekhar, is the third of NASA's four Great Observatories (with the Hubble Space Telescope, the now defunct Compton Gamma Ray Observatory, and the Spitzer Space Telescope). Sent into **N** orbit in July 1999, Chandra has electrified **D** the world with discoveries about the nature of black holes, the formation of galaxies, and the life cycle of stars.

**R** **A**

CHANDRA X-RAY OBSERVATORY



Unlike satellites such as Hubble that circle the planet every 90 minutes, Chandra orbits Earth every 2.6 days. It travels a third of the way to the moon to allow longer observation time and to skip through Earth's Van Allen radiation belts, which can disrupt imaging.



X-rays are photons of light with extremely short wavelengths within the electromagnetic spectrum. They reflect off a metal surface if they graze it at a very shallow angle, like a stone skipping on water. On Chandra's telescope, four paths of nested

mirrors direct x-rays to the path of incoming x-rays. These mirrors, totaling more than a ton of glass, are the smoothest ever constructed. The surface varies by only ten-thousandths of an inch to prevent bumps from interfering with the precise metal

the x-rays, which pass down the telescope and fall on either the advanced CCD imaging spectrometer or the high-resolution camera. Powered by solar panels, the craft uses no more electricity than is needed by two household hair dryers.



A celestial cyclone, a pulsar at the heart of the Crab Nebula fires off jets of high-energy particles in this Chandra image (right).

In A.D. 1054 Chinese astronomers watched in ██████ a star in the constellation Taurus grow brighter. The star had ended its life in a catastrophic explosion, or supernova, 6,000 years earlier, yet light from that event ██████ just reaching Earth. Today astronomers call the supernova's remnant the Crab Nebula, a cloud of gas and



X-RAY CRAB NEBULA

MASSACHUSETTS  
ASTROPHYSICAL  
OBSERVATORY

# S P E C T R A

dust six light-years across.

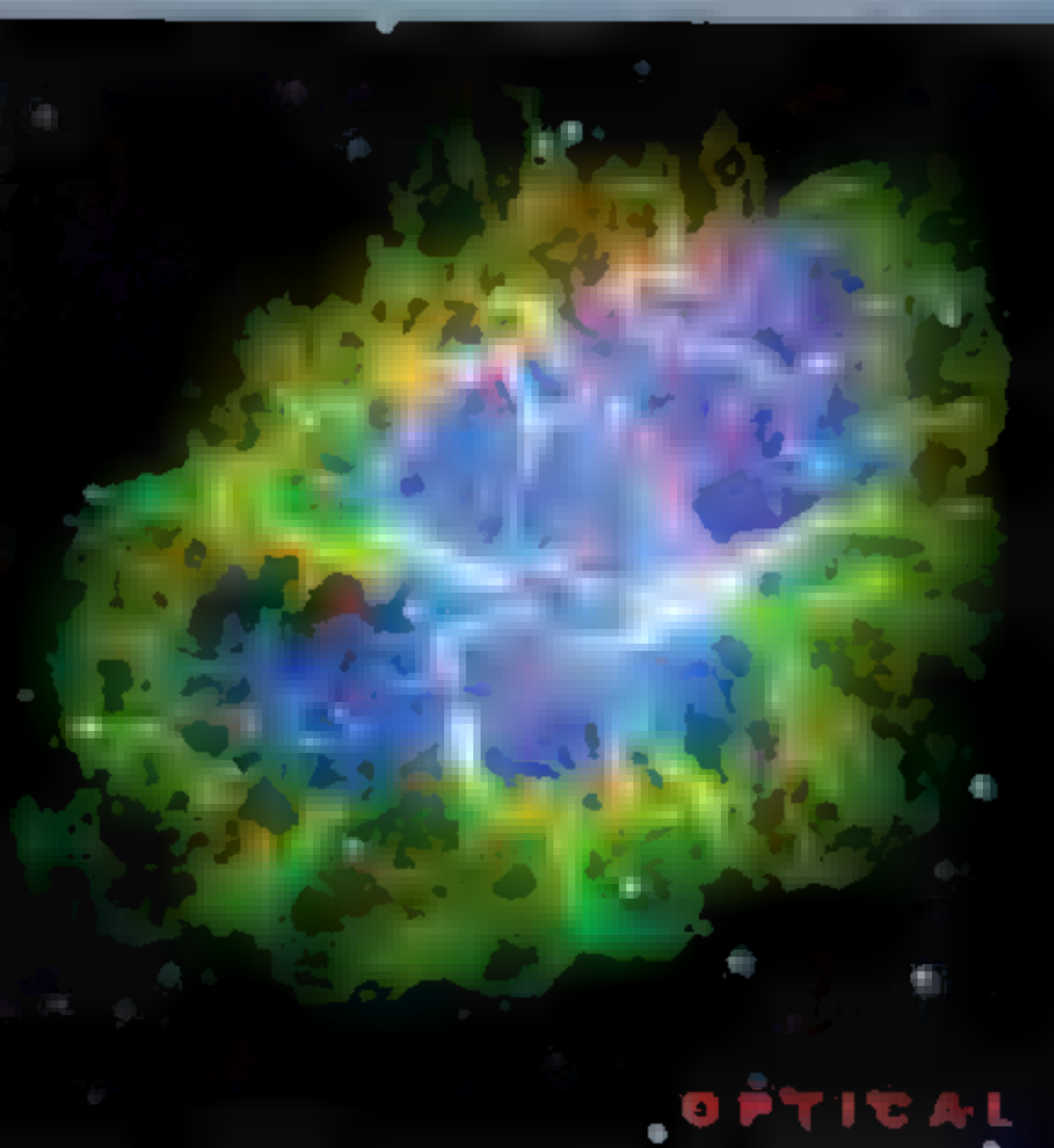
At the nebula's core lies a pulsar, a type of neutron star, discovered by radio astronomers in 1968. Only 12 miles across, it spins 30 times a second, spewing out high-energy particles. As particles flow out, they lose energy and emit radiation in longer wavelengths. Highlighted in

false color (below), optical image shows intermediate-energy particles from the pulsar (blue) along with material ejected into space by the supernova explosion itself (green and red). Infrared and radio images show emissions from lower energy particles.

In Chandra's x-ray image of the pulsar (above), scientists

see for the first time a doughnut of matter whose inner ring the shock wave caused by particles blasting from the pulsar. Particles also jet out from the pulsar.

Viewing the Crab Nebula in different wavelengths helps scientists construct a complete picture of its physical features.



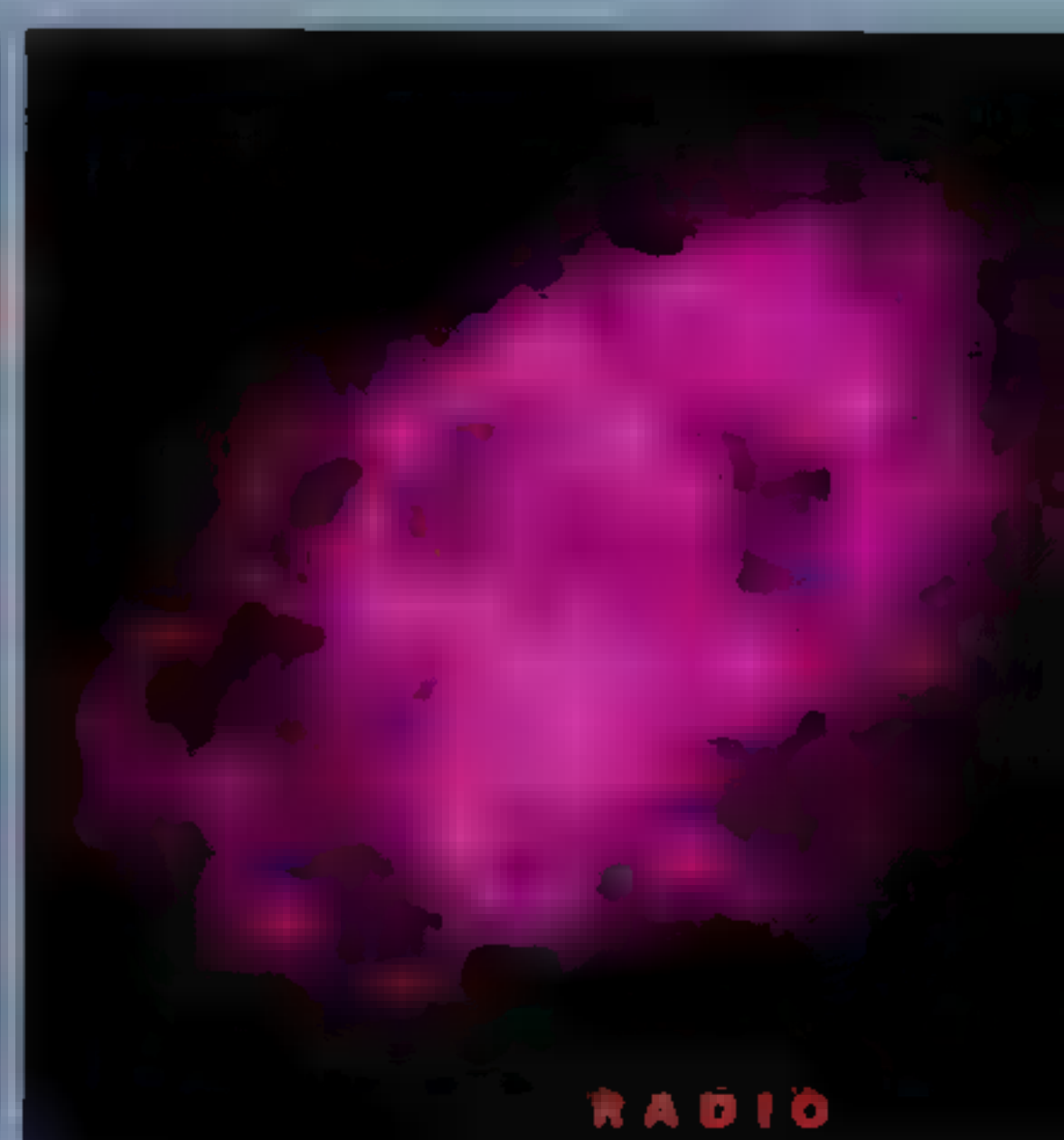
OPTICAL

PALOMAR OBSERVATORY



INFRARED

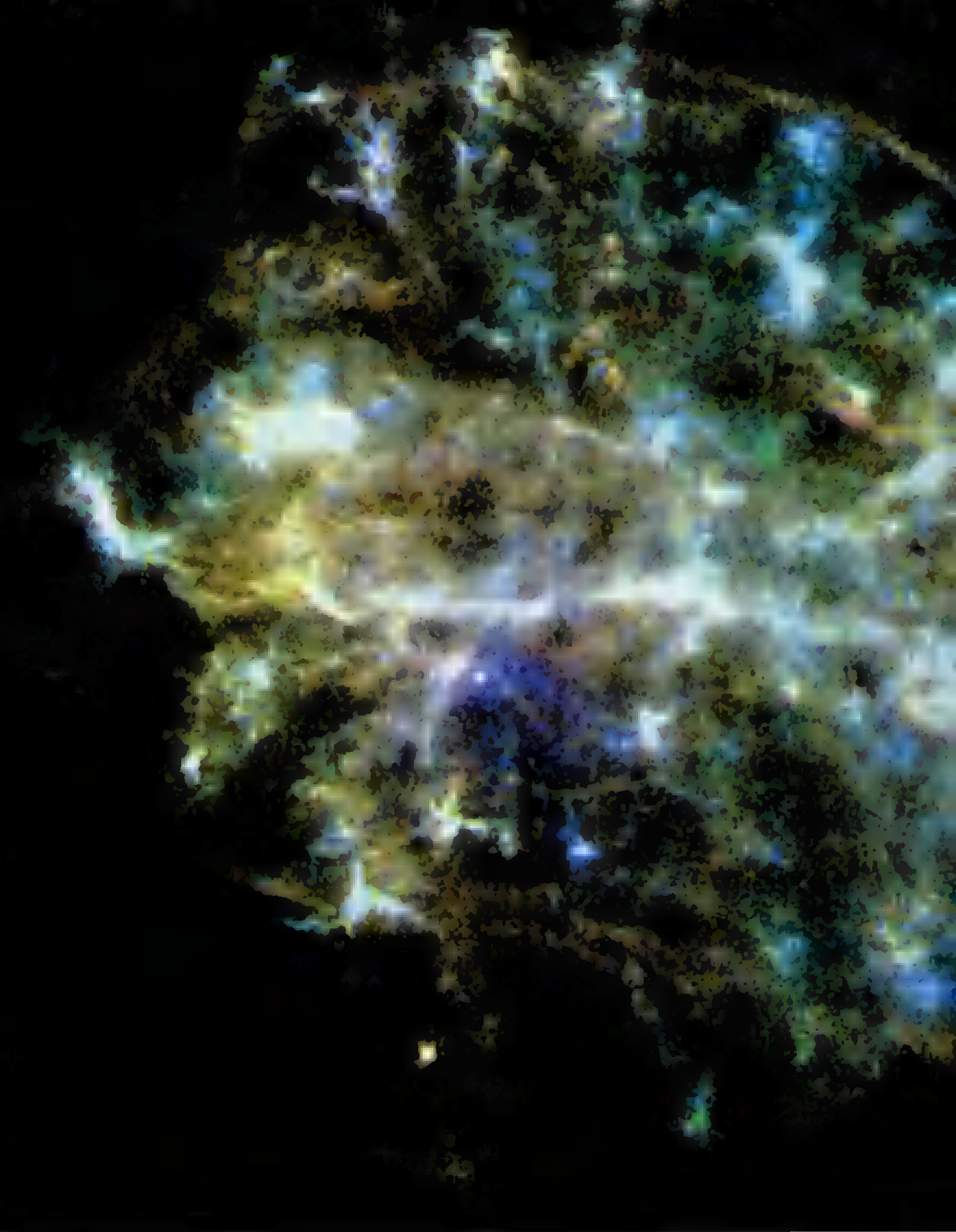
W. M. KECK OBSERVATORY



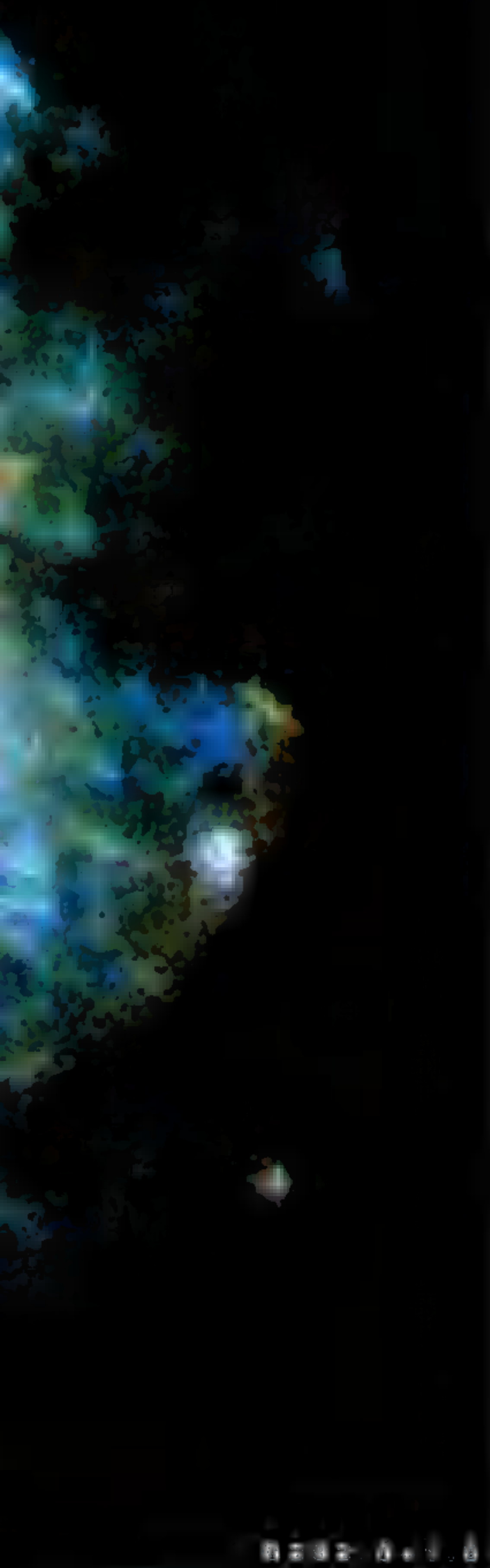
RADIO

VERY LARGE ARRAY NATIONAL RADIO ASTRONOMY OBSERVATORY

# S U P E R N O V



# A



A star explodes. Debris and energy blast out and glow as brightly as billions of suns. A supernova remnant is born.

Few events in the universe top the drama of a supernova, the explosive death of a star.

Stars known as white dwarfs may accrete matter from an orbiting companion and explode as the result of a runaway nuclear reaction. More massive stars, their cores fused into iron, collapse and instantaneously explode, sometimes leaving a small, dense neutron star. The explosions release such elements as carbon, oxygen, and iron — incorporated into new stars — and leave supernova remnants.

Chandra detects x-rays from these remnants. The 2,000-year-old remnant at left shows a pulsar (white spot near center), hydrogen-and-

helium-rich gas (white), and high concentrations of neon, magnesium, and oxygen (all blue).

Chandra adds a vivid dimension to a composite image of a remnant (below). X-rays (blue) show gas rich in oxygen and neon heated by outgoing and rebounding shock waves. Radio waves (red) sandwiched between the x-ray emissions show electrons accelerated by shock waves. Visible light (green) shows cooler oxygen.



COMPOSITE BY TERRY BALDWIN AND RAY  
OPTICAL: NASA/HUBBLE SPACE TELESCOPE  
RADIO: AUSTRALIA TELESCOPE COMPACT ARRAY

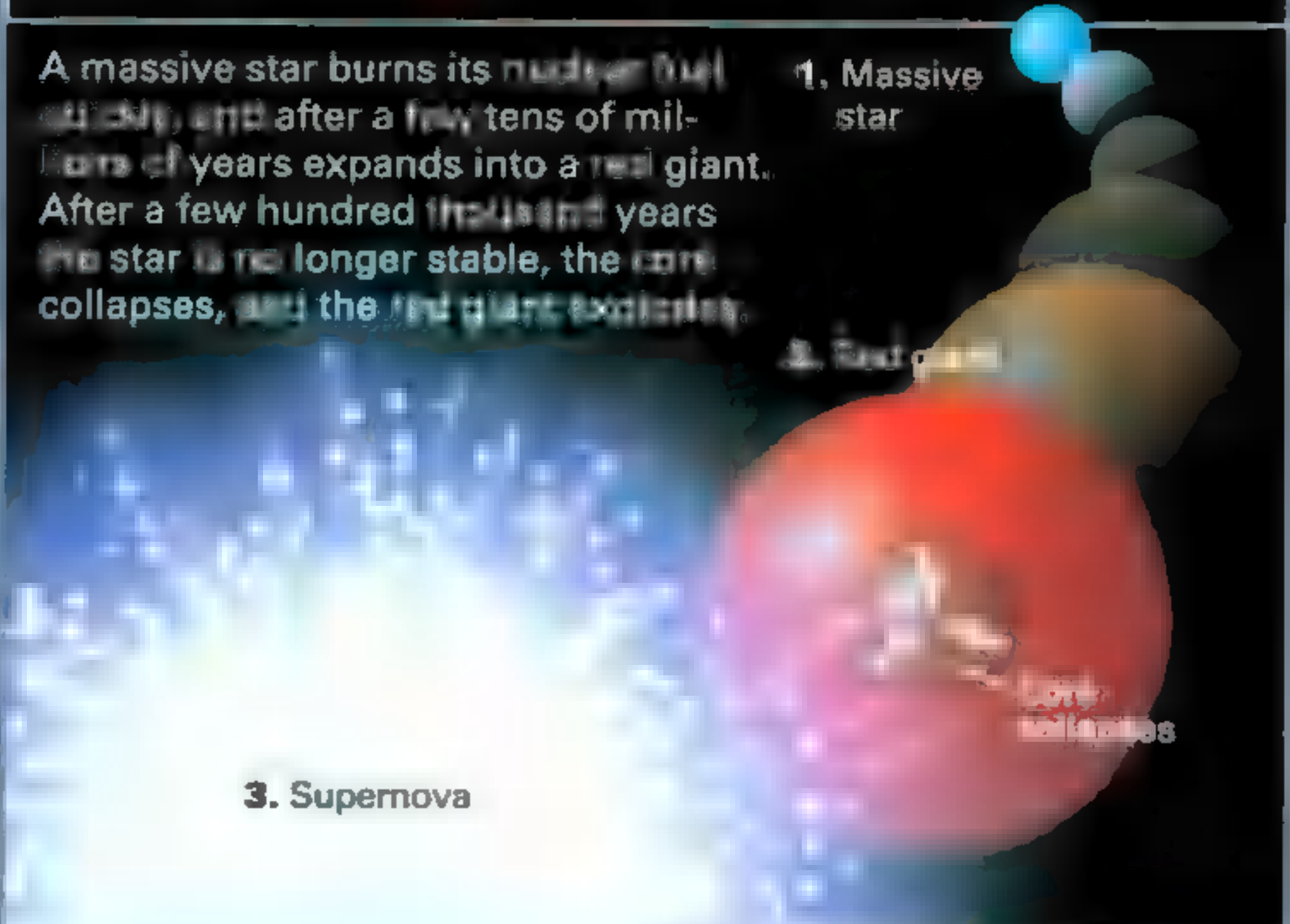
## LIFE AND DEATH OF A STAR

A massive star burns its nuclear fuel quickly, and after a few tens of millions of years expands into a red giant. After a few hundred thousand years the star is no longer stable, the core collapses, and the red giant explodes.

1. Massive star

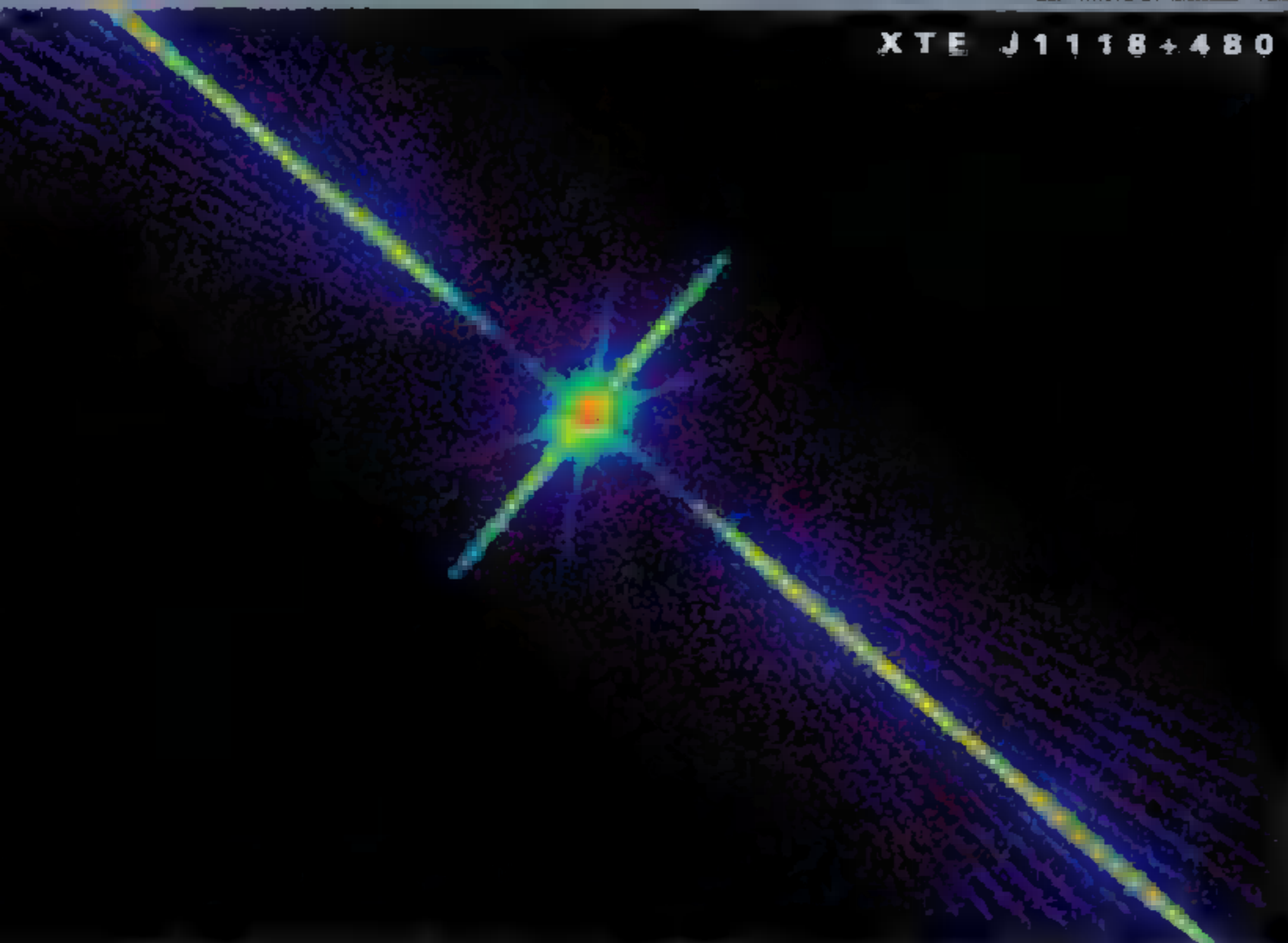
2. Red giant

3. Supernova



© 2001 NASA

XTE J1118+480



Chandra detects intense x-rays emitted by gases as they are accelerated, heated, and sucked into a black hole.

When a star far more massive than our own sun depletes its thermonuclear fuel, its core collapses into a black hole—a tiny point in space with enormous gravitational pull. The gravity is so great

# B L A C K H O L E



CENTAURUS A

that not even light can escape, rendering a black hole impossible to observe. Around this point lies an event horizon, a threshold like the lip of a drain. Outside the event horizon matter swirls in an accretion disk, becoming so hot that it gives off x-rays.

Chandra helped clarify the nature of an accretion disk by studying a seven-solar-mass stellar black hole 5,000 light-years from Earth. A device called a diffraction grating, flipped into the path

## LES

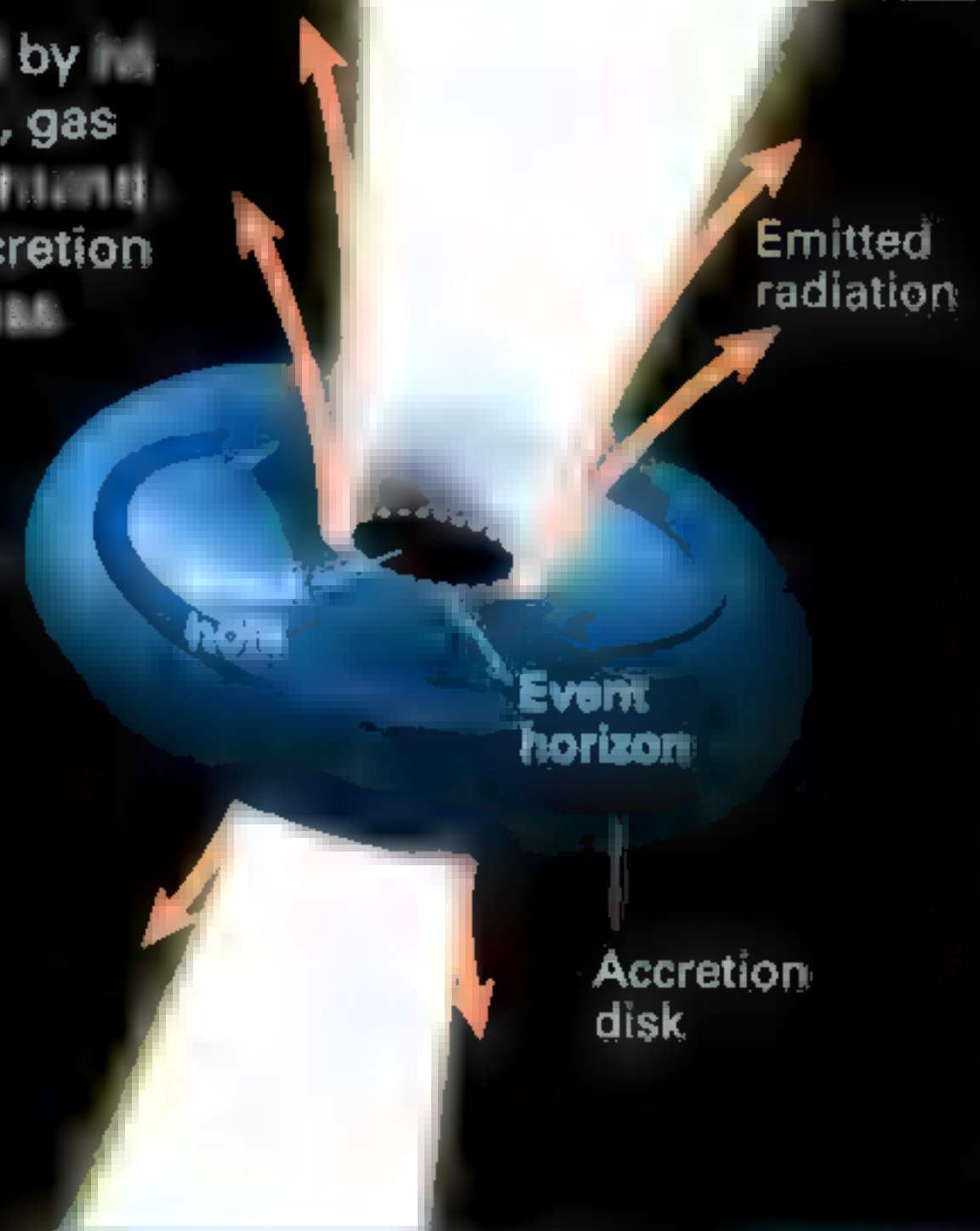
of the x-rays just behind Chandra's mirrors, disperses the x-rays according to their energies to create a spectrum (top left) the way a prism disperses light into a rainbow.

The bright diagonal line records x-ray energies given off when matter from an orbiting companion star falls toward the black hole. Analyzing the x-ray spectrum helped astronomers learn that the accretion disk lies at least 700 miles from the event horizon, much farther than the 40 miles previously thought.

Black holes tens of millions of times more massive, super-massive black holes, inhabit the centers of galaxies. If these black holes are actively accreting material, they too can emit powerful x-rays. One example lies at the center of Centaurus A, where an accretion disk fires a jet of particles 15,000 light-years into space. Hundreds of other x-ray sources—stellar black holes and neutron stars—

## HOW DO WE "SEE" A BLACK HOLE?

Attracted to a black hole by its strong gravitational pull, gas and dust fall into orbit around the hole, forming an accretion disk. Some matter crosses the event horizon and is pulled into the hole, and some radiates from the accretion disk at a wavelength that Chandra can detect.

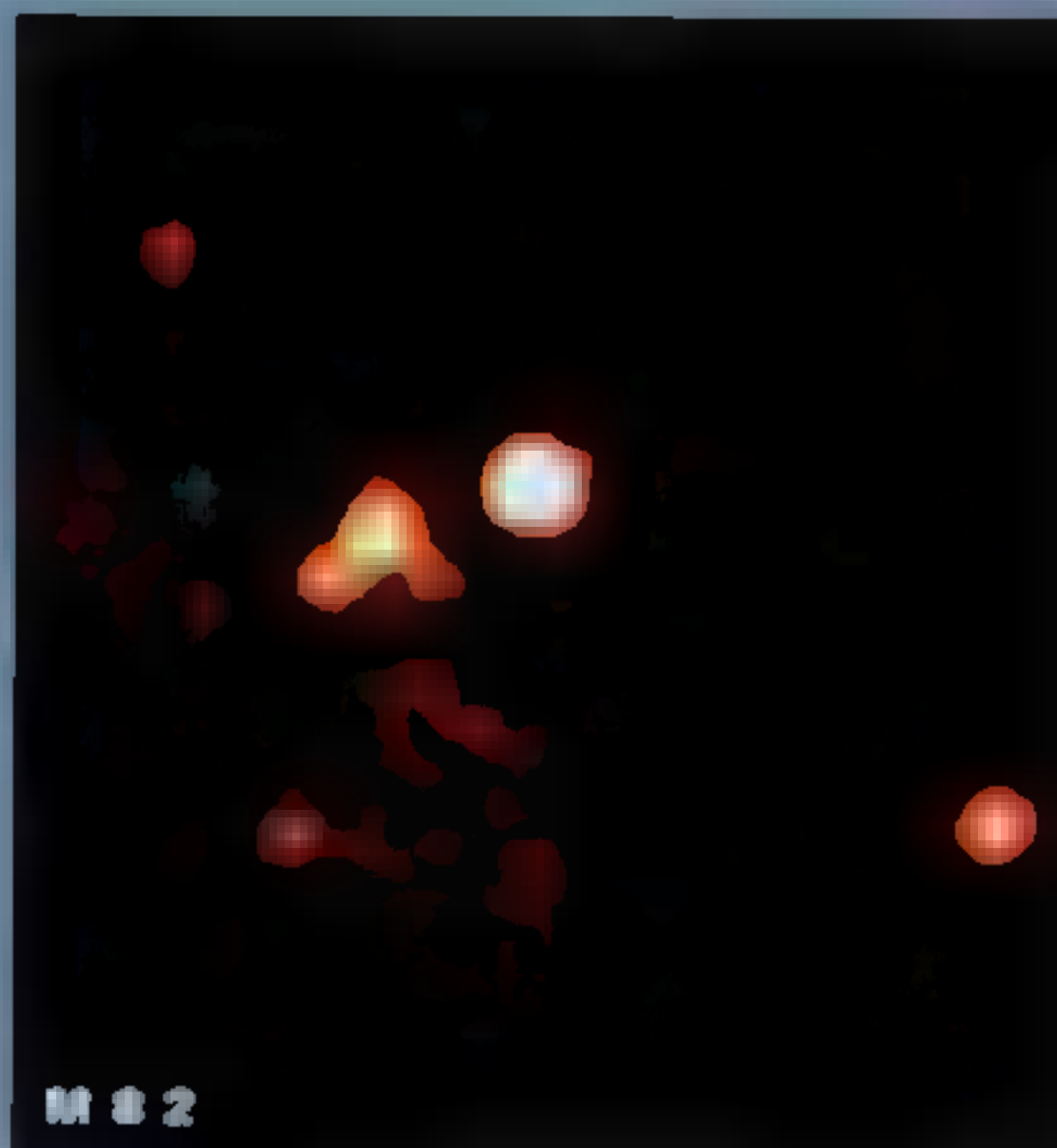


ART BY BOB WOOD

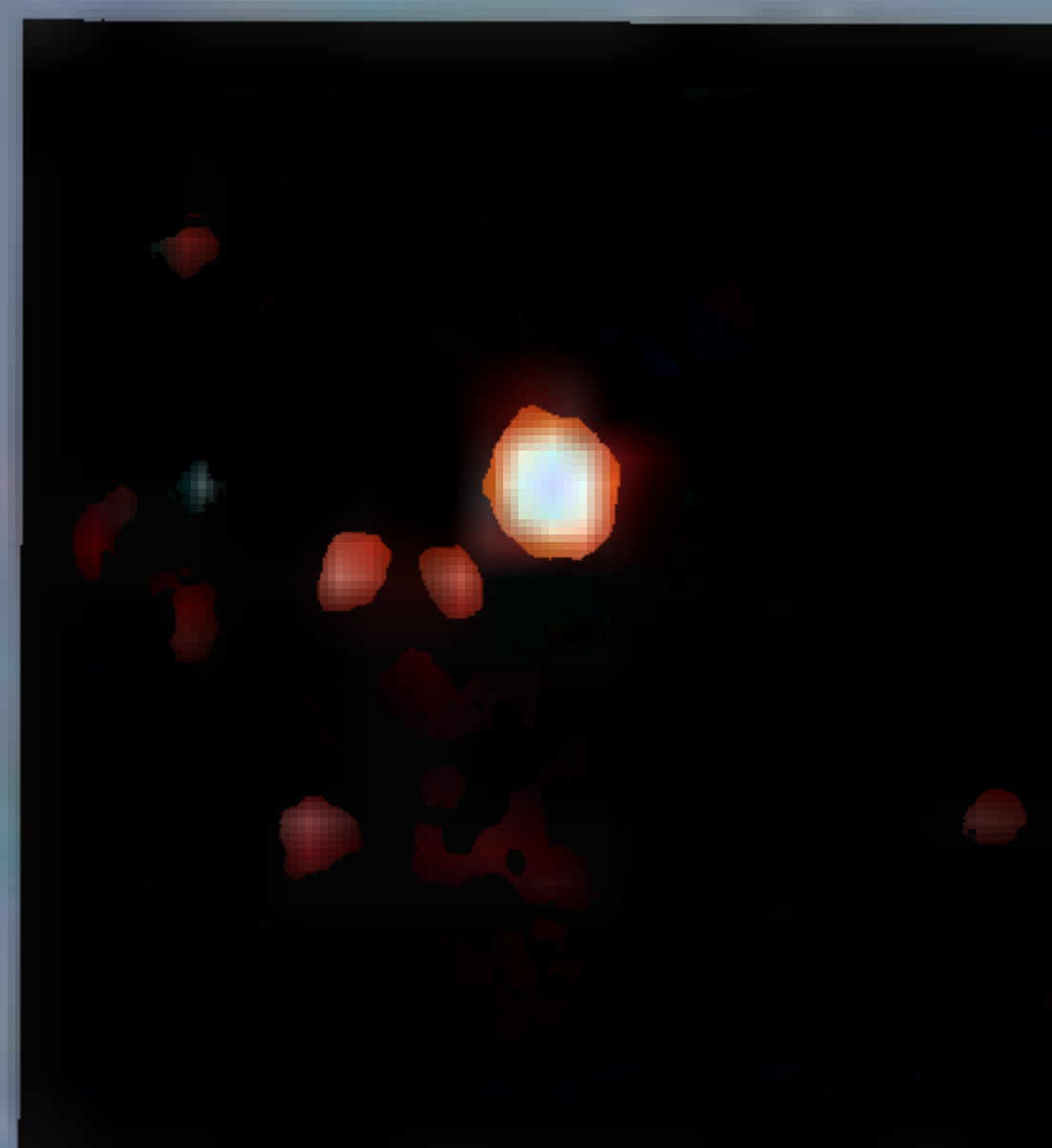
also inhabit Centaurus A.

Chandra has revealed a third kind of black hole, in the galaxy M82 (below). This black hole (brightest spot), floats 600 light-years outside the galaxy's center (green cross). Its x-ray intensity varied during the three months

between these exposures, showing it to be a black hole. Its brightness implies that it has a mass greater than 100 suns, which might put it in a class of midsize black holes—a missing link between stellar and super-massive cousins.



NASA/CXC/UMD



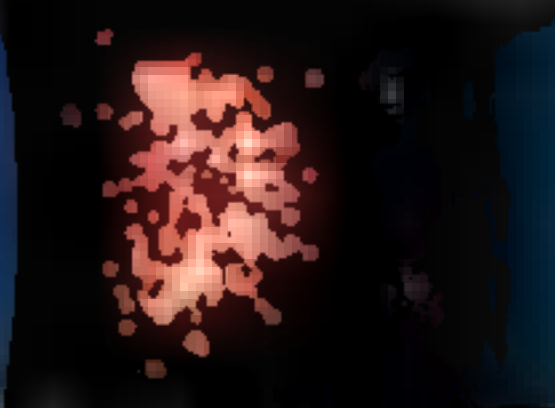
# DEEP FIELD SOUTH

## HERE AND BEYOND

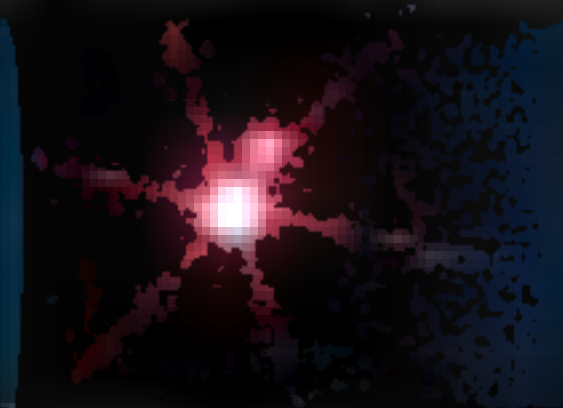
Chandra enhances our understanding of relatively near objects—like Venus—a weak x-ray source—and distant galaxies with their far ultraviolet emissions.



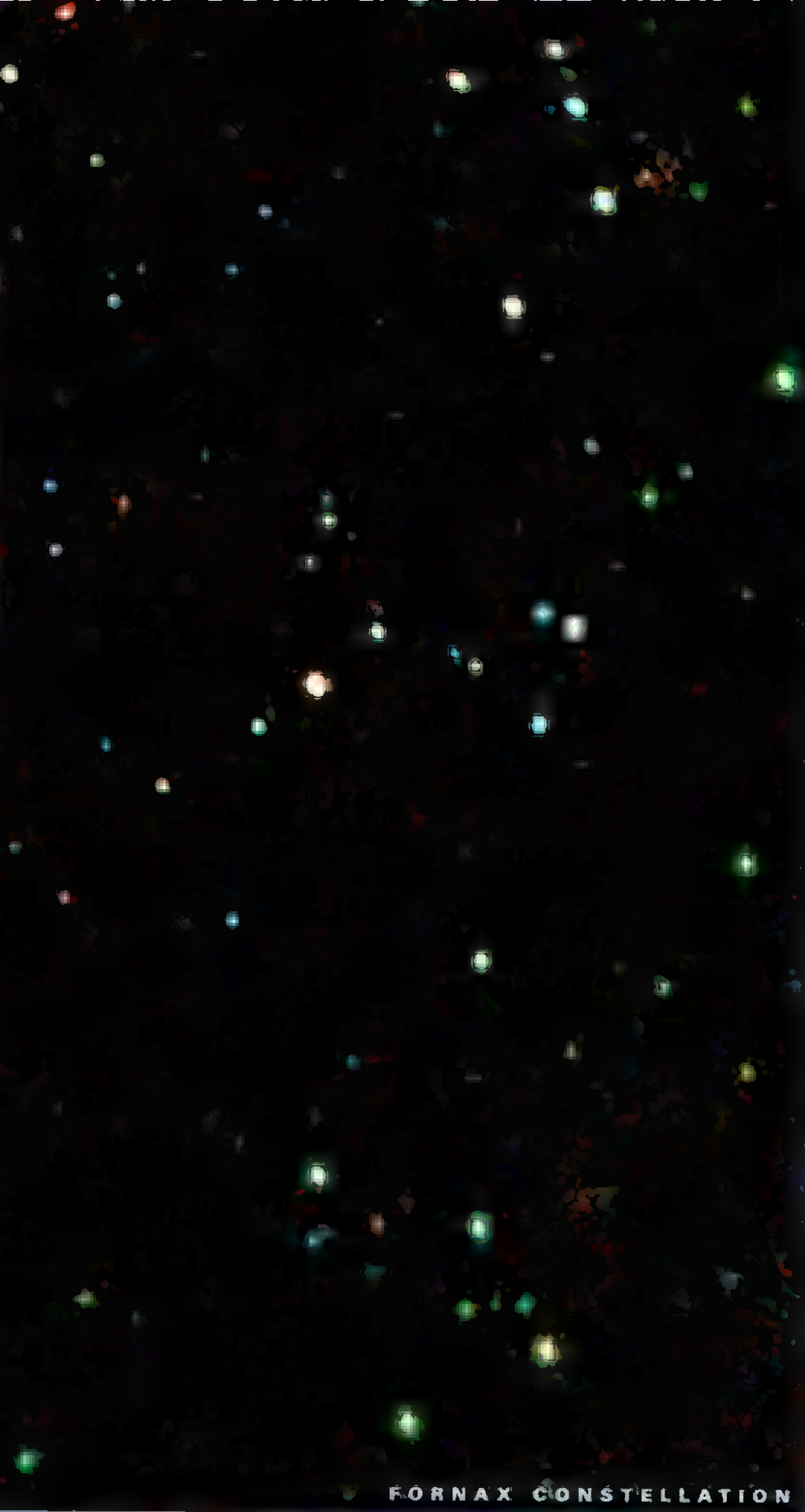
Earth



VENUS  
26 million miles  
from Earth



SIRIUS A and B  
Double star system  
8.6 light-years



**FORNAX CONSTELLATION**

NASA/CXC/ARPC/SAO/CONE/JOURNAL/MCKIM/UNIVERSITY OF ALABAMA/SAO/CHANDRA/0212

Distant space may hold many more black holes than once thought, as indicated in this x-ray image, one of the deepest ever made.

What could be emitting x-rays way out there? To find out, astronomers pointed Chandra into the southern hemisphere at a tiny patch of sky that appeared blank. For a total of 11 days over the course of more than a year, Chandra soaked up the faintest x-rays from this remote spot. Like a bore hole into deep space and the distant past, the resulting image, called Deep Field South, clearly showed a great variety of x-ray sources, including luminous quasars and active galactic nuclei powered by supermassive black holes. Chandra is giving scientists a peek at galaxies at a much earlier stage of formation. "That's the excitement," says Harvey Tananbaum, director of the Chandra X-ray Center at the Smithsonian Astrophysical Observatory. "Chandra shows us how spectacular the universe is." □

**MORE ON OUR WEBSITE**

Find web links to the Chandra X-ray Observatory plus more resources at [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).



**RX J1856.5-3754**  
Collapsed star  
483 light-years

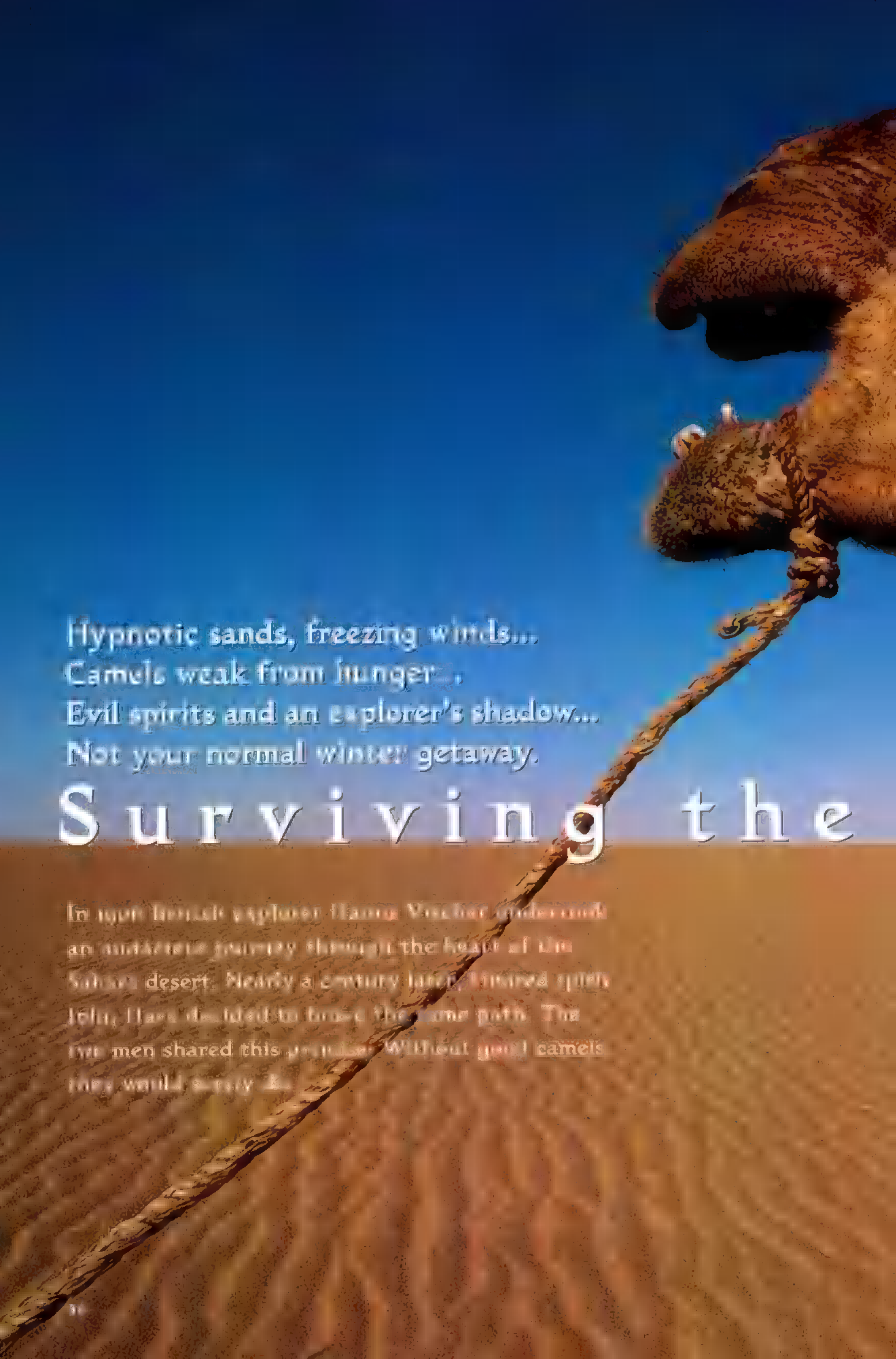
**MILKY WAY CENTER**  
25,000 light-years

**N132D**  
Supernova remnant  
160,000 light-years

**CYGNUS A**  
Galaxy  
750 million light-years

**DEEP FIELD SOUTH**  
12 billion light-years

ART BY ERIC WHEELER/IMAGES/NASA



Hypnotic sands, freezing winds...  
Camels weak from hunger...  
Evil spirits and an explorer's shadow...  
Not your normal winter getaway.

# Surviving the

In 1906 British explorer Hiram Bixler undertook an arduous journey through the heart of the Sahara desert. Nearly a century later, inspired spirit John Hare decided to trace the same path. The two men shared this journey. Without good camels they would surely die.





Sahara

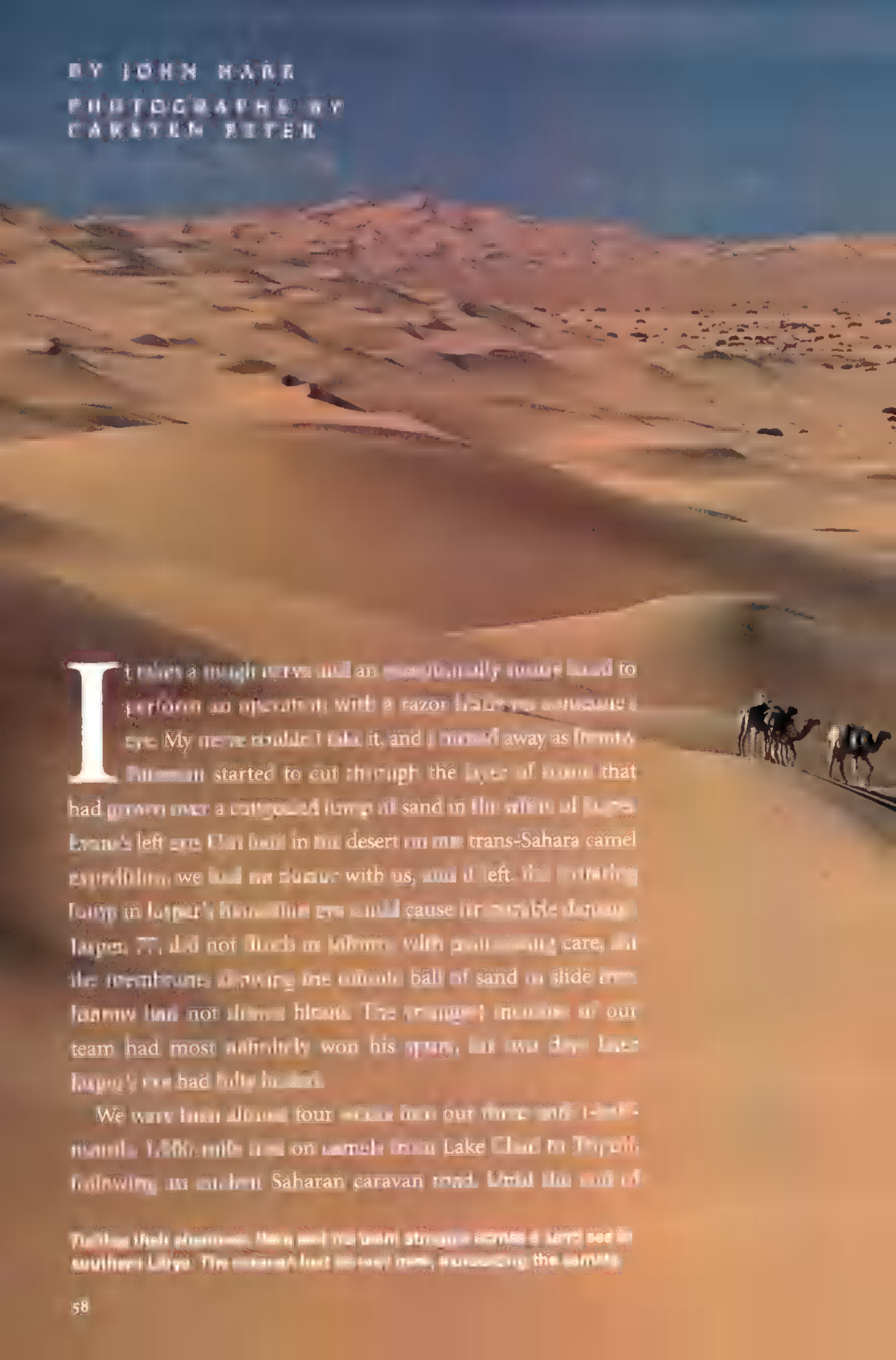


Thornbushes lay thick to an 18th-century fortress at the abandoned oasis of Mestuta in Libya, where



Hare watered his camels. His Tuareg guides implored him to leave quickly, calling the place haunted.

BY JOHN HARR  
PHOTOGRAPHS BY  
CARSTEN PETER



**I**t takes a tough nerve and an exceptionally steady hand to perform an operation with a razor blade on someone's eye. My nerve couldn't take it, and I moved away as Ibrahim Hassan started to cut through the layers of tissue that had grown over a collapsed lump of sand in the white of Lajper's left eye. That lump in the desert on the trans-Saharan camel expedition we had no chance with us, and if left, the protruding lump in Lajper's iridescent eye could cause irreparable damage. Lajper, 77, did not flinch in the least. With painstaking care, and the membrane allowing the minute ball of sand to slide from Lajper's eye had not stirred blood. The youngest member of our team had most definitely won his spurs, but two days later Lajper's eye had fully healed.

We were later allowed four weeks more out there with 1,000-mile round-trip journeys on camels from Lake Chad to Tripoli, following an ancient Saharan caravan road. Until the end of

The Nile itself stretches, there is no main stream across a large section of southern Libya. The nearest first-order river, surrounding the oases,





# The “Deadly Road”

Once ranked among the world’s illustrious explorers, Hanns Vischer (below) had become a faint footnote by the time John Hare, a fellow countryman and founder of the Wild Camel Protection Foundation, came upon Vischer’s 1910 book, *Across the Sahara*. The book detailed a grueling journey through the world’s largest sand desert. A Swiss-born educator who worked for the British Colonial Service in Nigeria, Vischer had become intrigued by the “deadly road”—the centuries-old route used to

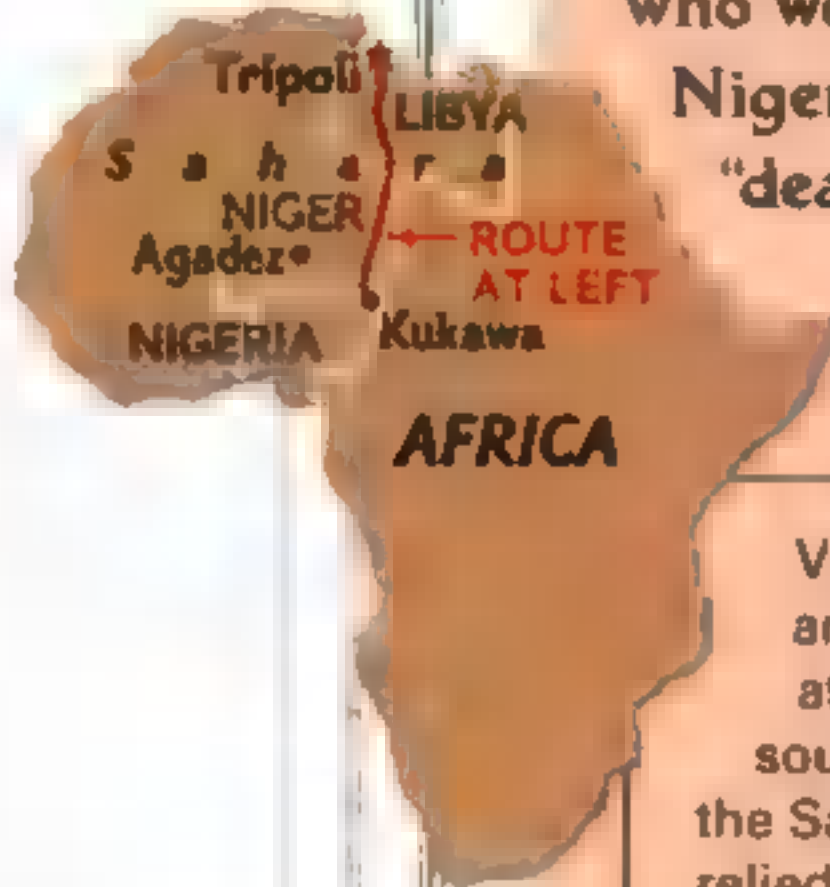


herd slaves, most of whom perished, from sub-Saharan Africa to the Mediterranean coast. Accompanied by religious pilgrims and newly freed slaves, the 30-year-old administrator—and

amateur painter (inset)—traveled the route in reverse, from Tripoli to Lake Chad. Vischer faced torrid heat and the threat of tribal raiding parties; amazingly he lost none of his team. After completing his journey in 1906, Vischer went on to devise an innovative curriculum for African schools, for which he was eventually knighted. Yet Sir Hanns never forgot the Sahara. “I had entered it frivolously, like a fool,” he wrote. “I left it as one stunned, crushed by the deadly majesty I had seen too closely.”

Hare traveled south to north, bettering his predecessor’s time because of shorter oases stops. Equipped with a global positioning system, Hare more often turned to Vischer’s map (left). Vischer himself, according to Hare, seemed close at hand: “He was with us most of the way.”

Vischer finished, and Hare began, at Kukawa on the southern edge of the Sahara. Hare often relied on the map (left) that appeared in Vischer’s account. Type has been modified for legibility. Place-names from the story appear in red with their modern spellings.



## Vischer—1906

- 1,581 miles
- 5½ months
- 40 camels, 2 horses, about 40 men and women
- Through Ottoman, French, and British lands

## Hare—2001

- 1,462 miles
- 3½ months
- 25 camels, 12 men
- From Nigeria through Niger and Libya



the 19th century this road was essentially a slave route between the sub-Sahara and Arab coastal towns, a blood-stained highway strewn with thousands of human bones. Only the most robust slaves survived the desert march, and these were little better than living skeletons when they reached Marzuq in southwestern Libya. Since the 19th century it has been used as a purely commercial highway by local camel traders. The last foreigner known to have completed a journey along this road was the Swiss-born British national Hanns Vischer, in 1906.

Hanns who?

Indeed, it was partly to restore the memory of Hanns Vischer, once ranked by the British as an explorer on a par with Sir Ernest Shackleton of Antarctic fame, that I wanted to make the journey from Kukawa near Lake Chad in northern Nigeria across Niger and Libya to Tripoli. Vischer is remembered with affection

Dear Vischer,

I prefer my staff to do the work they are paid for, rather than seek personal kudos or geographical advancement in foreign territory. . . . If you are bent on the journey, you should resign and make room for a man who is satisfied with his job. Plain speaking but I like to run my own show.

Yours sincerely,

W. P. Hewby

**S**o now, nearly a hundred years later, I determined to run my own show and make the journey Vischer had been unable to undertake. After a trying six-month wait, I finally had an acceptance from the Libyan authorities to cross their country with camels. After protracted negotiations with Sidi, a cheerful rascal from the Niger desert town of Agadez, 25 camels had been bought. Sidi had

## I loved his tale of terrible desert

in northern Nigeria not for his Saharan journey but for pioneering—against opposition in Britain—a revolutionary education system that gave due regard to the religion and background of the Hausa people, who are mainly Muslims. The system was later copied throughout much of Britain's colonial empire.

Vischer's book, *Across the Sahara*, which I discovered in the 1970s, caught my imagination. I loved his tale of stirring encounters in terrible desert wastes, where no water could be found for days and where oases were few and far between. I was gripped with a sense of the amazing capacity of a camel to survive in the toughest of surroundings and on the longest of journeys. Vischer told of hostile tribes and marauding Tuareg—all with a modesty that understates the staggering achievement of making the journey without loss of life and at the same time bringing freed slaves, who attached themselves to the caravan for protection, along an ancient camel road from Tripoli back to the safety of their homes in Nigeria.

Having completed this journey, Vischer asked his boss in the Northern Nigerian Political Service, where he was a junior administrator, if he could undertake it in reverse, from Lake Chad back to Tripoli. On September 19, 1907, he received this frosty reply:

been introduced to me as a Tuareg chief through whom it was safe to bargain over the expedition essentials. Saddles had been made, ropes acquired, and in early September 2001 the camels were trekking to our rendezvous in the southeastern Niger town of Nguigmi.

Our expedition team was varied and colorful. There was Jasper Evans, a camel owner and rancher from Kenya. "Japper," as he is known, had come with me on a 1997 expedition to survey wild Bactrian (double-humped) camels in the Gobi desert of China. A bush man of great charm and resource and an expert on camels and their welfare, he would be the team vet. There was Yuan Guoying, the "Professor," a sexagenarian retired Chinese professor of zoology, who had been an invaluable help in obtaining permission for me to enter the Lop Nur area of the Gobi to conduct research on the Bactrian camel. I was attempting to repay the Professor for his kindness by offering him a chance to be the first Chinese in recorded history to cross the Sahara on a camel. Johnny Paterson, British-born and younger by 30-plus years than the rest of us, had long experience traveling across Africa and Asia. Carsten Peter, a German photographer with a penchant for arduous undertakings (such as photographing volcanoes from inside the crater), would join us later.



We foreigners were supplemented by four Tuareg: Ehom and Argali, who were relatives of Sidi, and Adam and Asali, the descendants of Tuareg slaves. To augment their expertise with camels, we hired individual guides, three in all, for their knowledge of different portions of the route. Vischer took no Tuareg—in his day they were desert marauders, raiding oasis communities along the camel road. But the Tuareg on our team were cheerful, very knowledgeable, loyal, and hardworking, and they fully demonstrated the *amana*, or trust, in which Tuareg hold their camels.

Our caravan consisted of 25 camels, with 9 for riding and 16 for carrying baggage—loads of up to 200 pounds. Among the latter were five skewbald (brown-and-white) camels, which Jasper had read about as existing in Somalia and the sub-Saharan but had never seen. These remarkable creatures had blue eyes, and in the

unrelenting as a burr. Tiny, fiercely sharp grass burrs covered the entire 150-mile-long plateau, preventing us from walking with the camels when we were tired of riding, as the irritation they set up was intense. I marveled that, because of the lie of the camels' hair, the burrs did not stick to their legs. The Ti-n-Toumma was also alive with scorpions, pale brown or yellow and in various sizes. Although we once discovered six lying inert under a sleeping bag, no one was ever stung. Preparing us against snakebite, Japper had brought a battery-powered cattle prod. If applied quickly, he said, the electrical shock would mitigate the effect of a bite, and he had used it while on safari in Kenya. Fortunately we never had to test this apocryphal snakebite remedy.

**SOCIETY GRANT**

This Expeditions Council project was supported by your Society membership.

## wastes, where no water could be found and where oases were few and far between.



**History casts a spell as Hare uses the Hausa language to tell Vischer's story to villagers in Tajarhi, Libya. Vischer fought a gun battle here with Tuareg marauders.**

case of two eccentric camels, one blue and one brown eye. All five were deaf, a common trait with camels of that color. They were also—possibly on account of their inability to hear—the most fractious camels in the caravan.

**W**hen we left Lake Chad to begin the trek, we came to a seemingly endless undulating expanse of scrub spreading north, called the Ti-n-Toumma plateau. Our first obstacle was something as mundane but

Our guide through Niger was a Tubbu called Abba. The Tubbu are ancient inhabitants of the Sahara, where they scratch a living from dates or livestock in northern Niger, Libya, and Chad. Before Vischer's time they were constantly battling with the Tuareg, and the memories still rankle. I had learned from Sidi that the Niger Tubbu were agitating for an independent country, linked up in this cause with disgruntled Tubbu over the border in Chad and Libya. The wily Sidi had chosen Abba precisely because he knew that his ties with the independence movement were strong. He was a good choice: Any Tubbu who had an eye on our caravan as attractive plunder would have been seen off by Abba, whose daily rate of pay was a compelling encouragement to guide us safely through Niger and northward to Al Qatrun in Libya.

Detachment from the bustle and rush of modern living and assimilation into a non-mechanical world does not come in 24 hours. But we quickly discovered how to pack up in an orderly fashion, to handle ropes, and how,

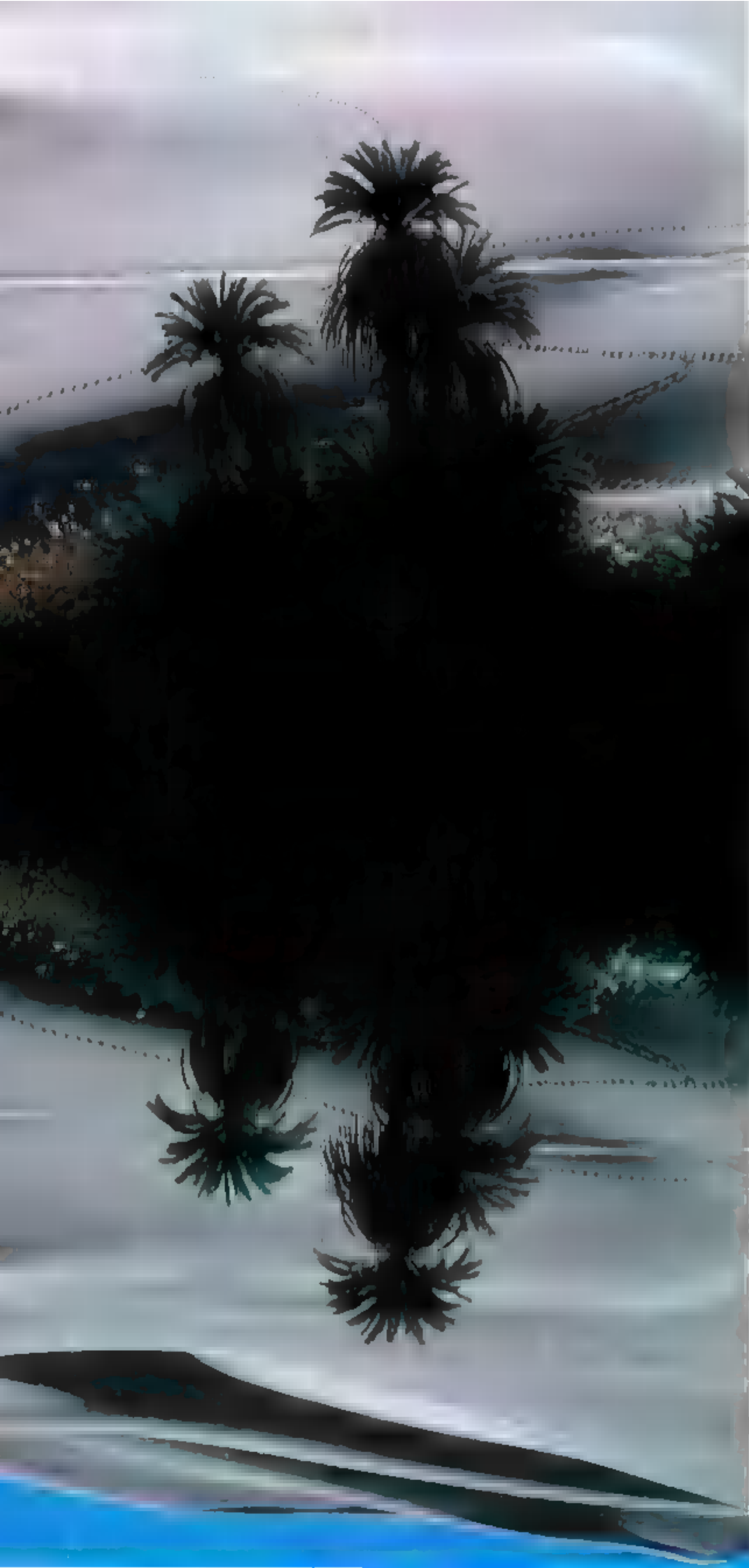


under Johnny's wary eye, to load the wooden kitchen boxes. It was hot at midday—pushing 100°F—and shade was welcome, but we found that it was not a good idea to take an hour off for lunch. If we did, then camels had to be unloaded and their loads tied back on again, a time-consuming exercise. We learned that the best way for us to cook at the end of a tiring day was to leave it to Argali and the herdsmen and not to attempt to do it ourselves. What they ate, we ate, and we followed this practice all the way until journey's end.

But traveling continuously for seven hours over a featureless landscape day after day does place an imposition on one's head. Johnny

often managed to read a book as he rode. I tried this, but after an hour the camel's swaying gait made me feel sick. If I read, I couldn't concentrate on my camel. The clever animal sensed this and would strike off on his own line, more often than not diametrically opposed to the direction in which the caravan was heading. On one occasion I attempted to sing my way across the Ti-n-Toumma; I struggled to recall all the songs and hymns lodged in the crevices of my mind. One can of course ride up to a colleague and talk, but if the wind is howling head on, this becomes impossible. So one is left with thoughts that can quickly wing away into realms of fancy.

As we plodded along, the scrub around us



jumped and shimmered in waves of heat. This and the imagined end of a Ti-n-Toumma horizon made the endlessly unfolding plateau seem irreducible—like dry bone. The blue of the sky was veiled in a hot, white haze, and a vindictive sun smote down on the hard-baked earth and frizzling sand, evaporating sweat before it left our pores.

Occasionally a tiny spiral of dusty chaff would start beside the track, dance along a yard or two, and then die down, before springing up again and whirling off into the bush with widening coils. Once more it would collapse, then suddenly rear up and come swirling down on us. From rustling murmur it grew to a rushing,

**After days of watery mirages, a lake truly appears amid a cluster of steep dunes near Takartibah. Hare's expedition found palm fronds for camels to eat, swarms of tiny shrimp, and the lonely tracks of a fox or jackal.**

crackling roar, hurling up in its vortex leaves and twigs and small stones amid a thick cloud of dust. Down it would descend, filling our ears and eyes and nose with prickling sand—spitting hot breath into our faces—and then it would dance off into the desert again, swaying and thrashing, just like a living thing, leaving us parched and gasping for breath.

**A**fter three weeks the sun-baked land of the burr abruptly gave way to towering sand dunes. We had reached the Great Erg of Bilma. At this point we were acutely conscious that we were, at last, in real camel country. We had slipped into a part of the world that mercifully the internal combustion engine had failed to conquer. In places the going was very soft, and although the camels sank hock deep into loose powdery sand, they struggled on, snaking around, up, and over the dunes, grunting when the uphill going was difficult and surging forward on a downhill slope. The baggage camels were all tethered together in a long line. As they descended the steep slope of a dune, Adam, who is no more than five feet tall, ran up and down the line urging them forward to ensure that the caravan kept an even pace. If it didn't, a tethering rope would snap, and the whole caravan would fall apart, causing us to halt while ropes were readjusted and retied.

Slithering down one steep dune, Johnny's camel, Albert, suddenly broke into a trot. Johnny was unprepared, and he fell off, crashing into the sand. The delicate Tuareg saddles are perched high up in front of the camel's hump. Once one's balance is lost, it's all too easy to fall out "through the door," and the drop is much farther than that from a big horse. Johnny was lamed and winded, so we made camp early. That evening the taciturn Asali scooped out a pit in the sand in which he lit a fire. The coals were allowed to glow for more than an hour and then were removed, leaving a baking hollow. Johnny was persuaded to stretch out in this hot sand bath. Next morning his stiffness had started to wear off.

While crossing the dunes, Jasper's camel was

hitched up behind Argali's for security, but this caused a problem when Jasper needed to stop for a pee. "Hey, Argali," he would call out in vain. "Stop, stop." But his words would often be misunderstood, and Argali's camel would plod on. "To urinate" in Hausa is *yi fitsari*, so Jasper's camel was dubbed FitzHarry, and when Jasper exclaimed, "FitzHarry! FitzHarry!" Argali heard and immediately understood.

**D**esert sand dunes rise and fall like something incarnate, time-bearing, at once peaceful and yet, in their isolated desolation, rather terrifying. After five days in the dunes, with a huge sense of achievement and relief, we slipped down to the oasis of Agadem, nestled on the western side of a range of mountains stretching in a broken line far to the north. The Professor bustled about the ruins of a French fort taking endless photographs with his prized digital video camera, popping in and out of broken walls that resembled crumbled biscuit. Although the oasis was unoccupied in Vischer's day, a hundred people now live there in rudimentary mud houses clustered together around a well. Their children rushed up to us clutching spearheads and arrowheads they had picked up in the desert. Some of these artifacts were immaculately serrated and of rare beauty.

Wending our way northward from Agadem toward Bilma, we passed through several more oases, each separated by about 20 miles of constantly shifting dunes. At one oasis, which was devoid of people, graphic footprints of giraffes,

**We were, at last, in real camel country.**





We had slipped into a part of the world that mercifully the internal combustion engine had failed to conquer.

Light sleepers, camels huddle against a January wind while their keepers burrow into down bags. “The cold was the most surprising—and difficult—thing about the journey,” says Hare. Photographer Carsten Peter used a long exposure and handheld flashlight to illuminate their camp. For simple pleasures, nothing beat the warmth of a cooking fire (far left) or a splash beneath a village water tank.

hippopotamuses, and elephants—animals that have long since disappeared from these parts—were embedded in the surface of an ancient dried-up lake.

At night at these watering holes, surrounded by an unending sea of sand, we lay down to sleep with a majestic display of stars glittering over us. Everything was silent and quite still, the stillness before creation. It was as though we and the camels were all that existed in the world. Sometimes a predawn mist lay over a surface so opaque that sand and sky were one. Then at daybreak a diffused light would brush the mist and stars away, and Johnny would stir to light a fire and make tea.

Our rations were nourishing but plain. Each evening Argali would cook for everyone. If we had bought a goat in an oasis, everything from the brains to the entrails would be mixed with macaroni, spaghetti, or rice. Vegetables, while

faster, allowing him to end quarrels among his retinue before blood was shed.

Pasha the camel had at first been truculent and unruly. But fully conscious that the best way to an animal's heart is through its stomach, I shared my pocket of dates with him while on the march. "Hey, Pasha," I would call out, and he would swivel his head round on his elongated neck and catch a date that I flicked toward him. Just as neatly, he spat out the stone. Soon he would come to me, like a dog, when I called him.

But as the Tuareg say, camels, like some people, have two characters. On certain days Pasha was biddable and calm; on others he was grumpy and obdurate. The trick was to ascertain at an early stage just what the mood of the day was and react accordingly. This dual nature applied to his relationship with the other camels in the caravan. Pasha was determined to get his share—and more—of the food. If he felt his

## Argali was ready with an explanation.

they lasted, would be added. Cabbages and onions kept longest, and the blackest, slimiest cabbage, when cut, would often contain a succulent green heart. When meat and vegetables were finished, there was often a long period of plain macaroni seasoned with chili peppers and tomato puree. What was left over at night was heated up for breakfast. Lunch was a pocketful of dried dates, eaten on the move.

The farther north we went, the colder the nights became (often below freezing), and loading the camels after a hurried breakfast could take from one to two hours. The cold stiffened our fingers, making them unwilling to grasp and haul on icy ropes. Neither Jasper nor I chose to sleep in a tent, which made it easier for us when it came to bedding down or loading up. As we packed, we were engulfed by the groans of the baggage camels. If the loads were not evenly balanced, a camel would soon let the loader know—with a prolonged howl of disgust—that he had done a bad job.

By the time we reached the ancient oasis of Bilma, 520 miles from Kukawa, my affection for Pasha, my riding camel, was matched only by my admiration for the way he had safely reconnoitered the dunes. I named him for the horse Vischer had acquired in Kidwa—on horseback he could get around the caravan

share was not large enough, he would give a rival a smart bite in the withers. This of course could equally well be returned with credit. For ten days I couldn't ride Pasha, as my saddle would have aggravated two large flesh wounds a wither bite had exposed.

**B**ilma is a mud-brick town surrounded by date palms and clumps of grasses and built around an infinitely beautiful and precious spring, where migrating birds of all descriptions pause among seductive greenery during their long flight over the desert wasteland. Vischer had met the Tubbu chief of Bilma, a man called Maina, describing him as "half blind, deaf, quite lame, and over 100 years." We were introduced to Maina's grandson, a cultivated man named Agi Marder Taher, the government official in charge of Bilma. He was delighted to meet us and entertained us in his house—the only one in the town built with cement—to a meal of goat, mutton, rice, and potatoes. To our shrunken stomachs this spread took on the appearance of a banquet.

"Can you take me back to England with you to meet Vischer's sons?" he asked, as bare bulbs in the room flared and winked with the fluctuations of his generator. I politely declined but sensed that Vischer himself would

have been delighted to learn of this meeting.

From Bilma our route toward the Libyan border led us into an area of ancient desert that had no vegetation whatsoever. “No bird is seen,” wrote Vischer, “no living animal, not even the smallest insect and the roughest grass can live among the dark broken stones which cover the surface of the road.” With this in mind I had bought grass for the camels and additional supplies for us. Not one of the Tuareg had undertaken this stretch before, so it was difficult to gauge just how much grass to buy. As it would turn out, I seriously underestimated both the length (180 miles) and the unyielding conditions of the route, along which the bones of camels on either side of the track gave stark testimony to this “howling wilderness,” as Vischer described it.

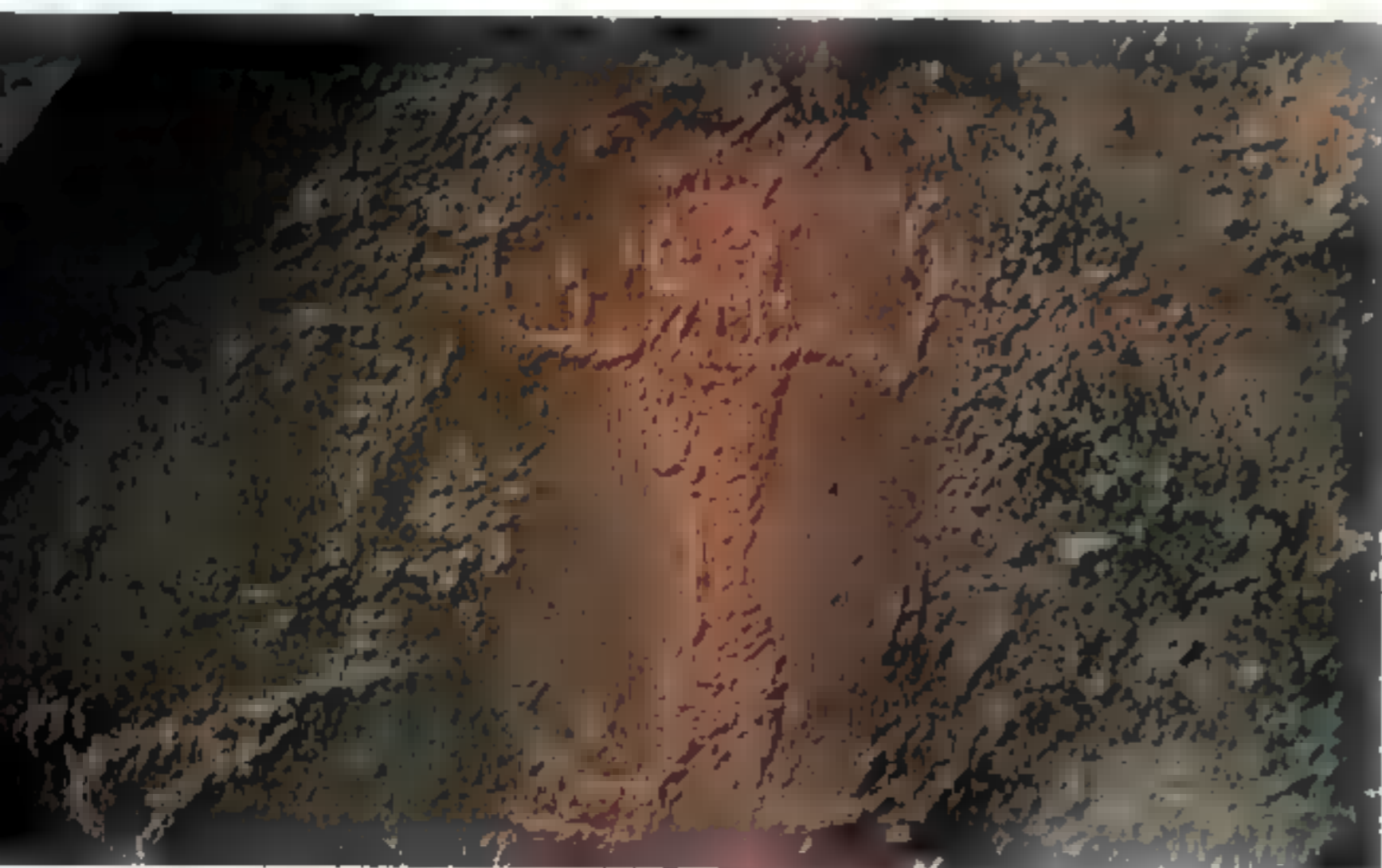
The northeast wind kicked up clouds of sand, which stung as it blew into our faces.

■ hundred days, then we will have done four million swaybacks,” he commented. “That’s a Chinese first that should be entered in the *Guinness Book of World Records!*”

After five wearisome days and bleak nights we reached the scruffy border post of Toummo, where Libyan soldiers and police barred our way with a succinct, uncompromising message. “No foreigners allowed to cross here.” After an enforced wait of two days, clearance to proceed came down from on high. Advance preparations had paid off.

**T**he road now worsened. The frigid wind screamed across the wilderness, driving dust and sand straight into our faces. Hunched up on his camel in army fatigues, his turban tied around his head like a bandage, the Professor resembled a First World War soldier with a serious head wound.

## “The jinn are making sport and trying to ride the camels. The sooner we leave, the better.”



**What accounts for blinding sandstorms and mirages that lead travelers astray? Tuareg say it’s the work of jinn. One such prehistoric spirit appears on ■ rock ■ Yat oasis in Niger.**

Jasper was hunched up on his saddle, swathed in yards of white turban. Slung on his back facing the sun was the solar panel for charging the satellite phone—a reluctant concession to our times. The wind prevented conversation between riders, and I continued to struggle to read a book. But it was no good—the camel’s gait induced nausea, and I had to give up. Noting this, the Professor said he had worked out that we swayed backward and forward 4,000 times an hour. “If we travel ten hours a day for

My miscalculation over camel grass was now starkly apparent: The camels would have to go without grass for three more days before we reached Tajarhi, the first Libyan oasis ahead of us. Camels can go without water for seven days or more, but if they’re working hard in hostile conditions, they must be fed. I grimly surmised that some of our weaker camels would be joining the skeletons by the roadside.

The first night without grass was terrible. We bedded down by an ancient cluster of rocky grave stones, which gave some protection from the wind, and the hungry camels stood pathetically around us, staring. “What are you doing?” they seemed to ask. “We worked hard for you all day. Where is our food?” I felt shamed. Next morning the fetid smell of their breath confirmed, if confirmation was needed, that their stomachs had ground all night on nothing.

With heavy hearts we loaded them up once again. Then a miracle occurred. We reached a point where another caravan had camped overnight. Unlike us, they had adequate supplies

**Crowded with buyers and slaves at the peak of the trade 200 years ago, the old quarter in Takartibah, Libya, slowly returns to dust. On the trail near here Vischer ■■■ the skeletons of slave children.**

of grass—so much that they had left some of it lying in the sand. We jumped off and scraped it together with our bare hands, separating sand from nourishment. Next day the miracle recurred, when we came across another campsite with more surplus grass.

The howling wilderness had one more miracle up its dusty sleeve. For days we too had lacked what to us was a basic sustenance: alcohol. One evening as the sun was sinking, we noticed a sack lying in the sand. Argali went off to investigate. To our utter amazement it contained liter bottles of whiskey. Some poor traveler must have taken fright before he approached the customs post at Toummo and jettisoned his contraband. We took two and gave up prayers of thanks.

**T**he whiskey and grass carried us through to the important oasis town of Al Qatrun. Since leaving Kukawa on October 24, precisely two months earlier, I had not seen my face in a mirror. Although I had shaved as best I could, guiding the razor through the gullies and over the weathered contours of my jaw, now I was face-to-face with reality, and it wasn't a pretty sight.

The next day was Christmas Day. It was also Jasper's last with us, and I felt an overwhelming need to look and feel spruce. (His son was getting married on New Year's Eve, and he was to leave by bus to return to Kenya. All of us, including the camels, were to miss him greatly.) I wanted to shed the mad scientist image that tousled locks conveyed and wallow in the luxury of a personal shave. Poor Abdul, the Qatruni barber, he was slightly unnerved at the sight of his extraordinary customer.

Of an indeterminate age that hovered around 40, Abdul was plump, dressed in a dirty white shirt and soiled fawn trousers. He had a disconcerting tic that caused his head to jerk involuntarily to the left every few seconds, and I wondered idly whether his hand would keep his gleaming cutthroat razor on an even tack around my whiskers. He held up a pair of scissors and hand-operated clippers in each



hand and waved them in front of me. I pointed emphatically at the scissors, and moments later he had dived into my graying locks with unrestrained enthusiasm. As soon as the first furrow had been plowed, I realized the damage was done, and when he concluded the operation, I was shorn like an old ram in midsummer.

As we moved into the Desert of Marzuq, patches of shingle and shale giving way to vast expanses of sand, the Professor excitedly drew our attention to butterflies. Were they migrating? And dragonflies. How do they survive without water? But our camels saw something else. At one picturesque, uninhabited oasis, they would not settle for the night. They charged





about in a group. Then they would suddenly stop, stare into space for a moment, and set off in another direction.

As usual Argali was ready with an explanation. "There are jinn [evil spirits] here," he confided, "The jinn are making sport and trying to ride the camels. The sooner we leave, the better." The temperature that night, New Year's Eve, dropped to 23°F, and once we left, early the next morning, the camels settled into their uncomplaining, uncompromising, steady gait of two to three miles an hour. The restless spirits were left behind to frolic in their haunted oasis.

Like many other Libyan townships, the ancient camel staging post of Marzuq, with its

dried-mud habitations (a place of "pestilence and fever" to Vischer) had been cleared in the 1970s by government decree, its citizens moved into concrete new towns. I pottered about the Marzuq ruins and the majestic old fort. The foundations of crumbling mosques and collapsing houses were cluttered with rusting tins and broken bottles. Unlike Vischer, who had spent more than a month here resting and taking on fresh supplies, we stayed for only a day.

After passing through the Fezzan, a benign oasis belt verdant with cultivation, we encountered dramatic sand dunes—400 feet high or more—encompassing a dozen or so mysterious desert lakes. I viewed the dunes with



Fierce monotony of sky and sand rules the Desert of Marzuq, where Harri's team huddled tedium



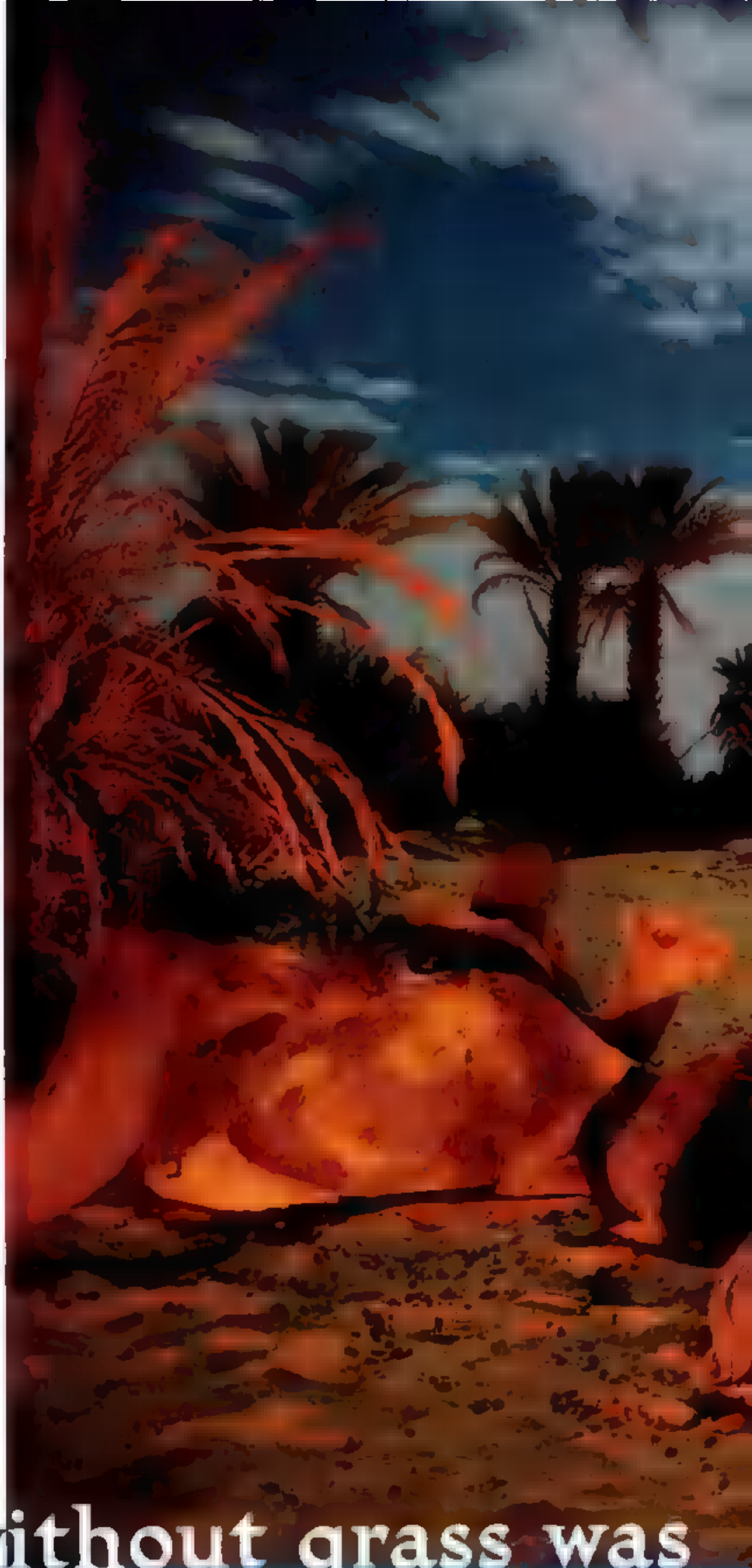
From hours spent wading across a camel. Deep sands and lack of food here nearly broke the animals.

apprehension. The camels were hard and lean (and so, by this time, were we), but the extra effort involved in crossing these great mountains of sand could prove daunting.

Earlier we had picked up a new guide, a Libyan Tuareg called Shikou, who was dressed in garments befitting the *Lord of the Rings* or Aladdin's genie, with a huge turban and voluminous robes. These were matched by his overwhelming urge to talk to anyone in sight. If there was no one to talk to, he would talk to himself. Not far ahead was our last formidable barrier, the Hamada al Hamra—a barren, rock-strewn plateau stretching more than 180 miles from north to south and 300 miles from east to west. Vischer summed it up as the “first in terms of difficulty among all the deserts in the Sahara . . . where shouts and laughter cease and the human voice is drowned.” Vischer was wrong. Nothing could drown the voice of Shikou, who never stopped talking.

He was certainly a better talker than he was a navigator, and it soon became clear that he was unsure of his way. The Hamada al Hamra presented the prospect of a pitiless six-day crossing in the best of circumstances, but by the time we reached it, Shikou was well and truly lost. By misdirecting us, he extended the hamada crossing by a further two days.

As we climbed onto the plateau, I was worried. The camels were tired, some nearly exhausted, and one or two had started to stumble, always a bad sign. Halfway up, just for an instant, I had a curious sensation that Vischer



## The first night without grass was





terrible. I grimly surmised that some of our weaker camels would be joining the skeletons by the roadside.



**Unburdened for the night, camels hunker down within the glow of the campfire. The rigors of the journey weakened one camel to the point that Tuareg handlers bled it (left), a traditional remedy. In the end Hare lost two camels to hunger and exhaustion. Remains of unlucky beasts from years past littered the path (far left). "I started counting dead camels," Hare said, "and when I reached a thousand I gave up."**

**Caravans and desert skies fill a camel's eye. At journey's end Hare found a buyer to keep the camels alive and well. After all, says Hare, "they were our lifeline."**

was beside me. "It's going to be all right," he seemed to say.

For the first two days we found tufts of rough grass, which enabled the camels to fill their stomachs. But then it was clear that two of the camels were utterly exhausted. I willed them to continue. If only they could make the six-day journey to the well at Tabuniyah at the northern foot of the plateau, they would be surrounded by lush vegetation where they could eat, rest, and possibly recover.

Argali and Asali fashioned boots for one of them to help him overcome the problem of cracked and swollen feet—first from sheepskin, which in a day was cut to pieces by razor-sharp stones, then from the stout inner tube of a truck tire. This kept him going for two more days, but then utter fatigue took hold. He would go no further. My daily journal is explicit: "Very cold night which froze half an inch of water in the hand washing bowl. . . . At about 4 p.m. I am forced to abandon the exhausted camel which is being dragged along by its rope at the tail end of the other camels in the caravan. I hate doing it, but I know that now there is no alternative. So we release the poor creature that has served us so well, to an inevitable end."

Soon the second camel would also give up. If we'd been carrying a gun, I would have ended the camels' lives quickly, but the alternative, to slit their throats, was beyond me and the Tuareg, who will never kill a camel.

**N**ext day, Shikou was also released, loaded onto a van—the first vehicle we had seen for days—whose occupants were scouring the desert, hunting gazelle. His departure induced in us all a collective sigh of relief. Argali took over as guide and, by a great slice of luck, took us down the escarpment and into a long narrow valley that led to the Tabuniyah well. Tamarisk and acacia trees abounded for the camels, and it did not need much imagination to picture the great south-bound caravans that had rested there since Roman times, before setting out to tackle the rigors of the Hamada al Hamra.

We now struck north for the township of



Mizdah, the end of the journey. Beyond Mizdah was a sprawling suburbia, unknown to Vischer, that led to the bustling Libyan capital of Tripoli—no place to take camels. For the first time we found ourselves walking by the side of a tarmac road. Taking pity on our wretched appearance, drivers slowed down and threw loaves of bread out of their cars.

We camped five miles outside Mizdah, and I looked for a buyer for the camels. Libyans are partial to camel meat, and I was determined that market traders with long knives would not get hold of the animals that had served us so well. I ended up selling them to a tour operator, fervently hoping I had convinced him



that, once rested, they would provide a good financial return from foreign travelers.

The rush of traffic, the frenzied negotiations with hard-faced business men, the plaintive, mystified look of our uncomplaining camels, our emotional farewells to the Tuareg—all forced on me the realization that our

hundred-day retreat into the unhurried world of the camel and our relationship with Hanns Vischer was finally broken. I looked up at the stark, flat-topped mountains

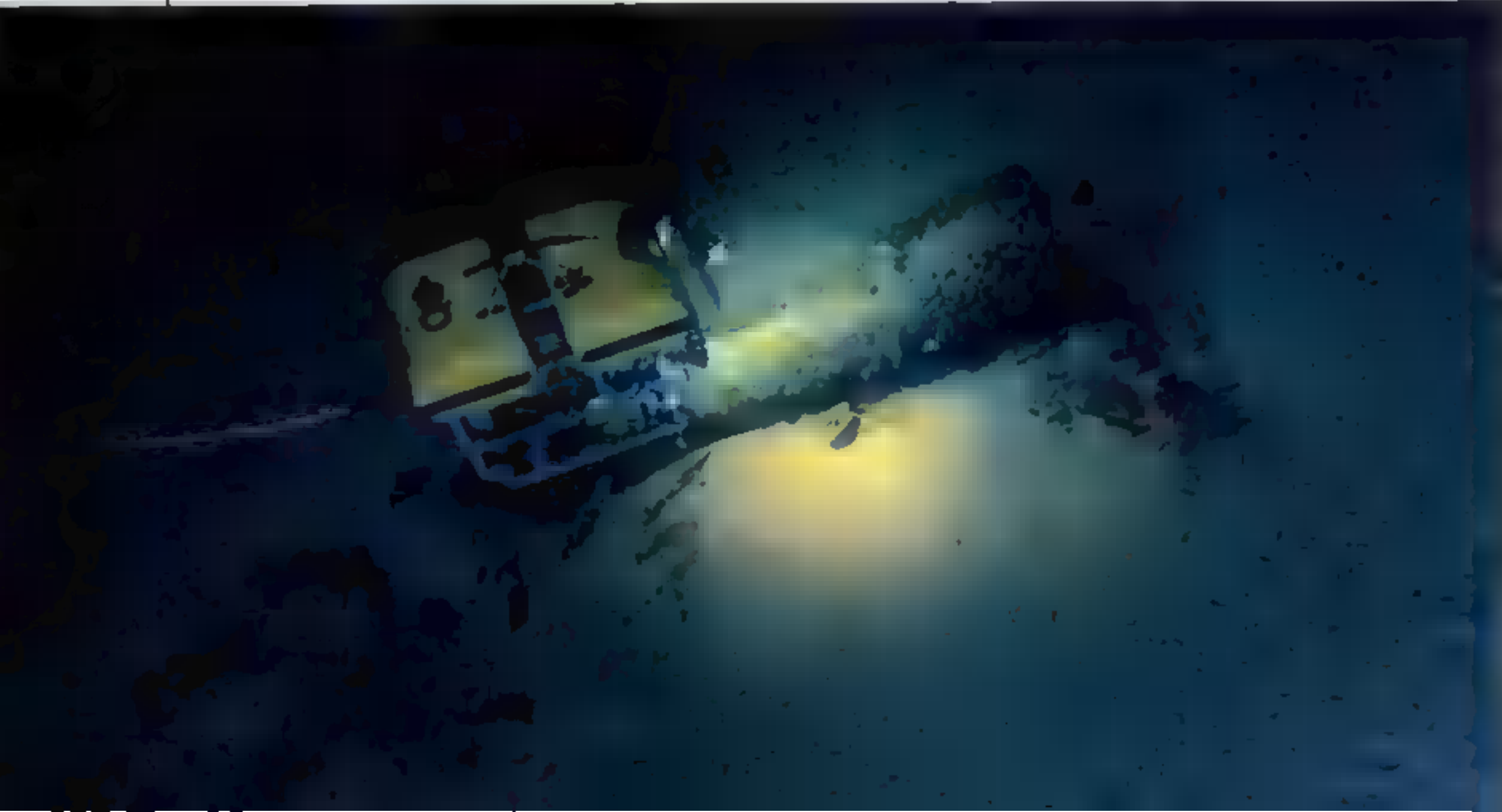
that surround Mizdah and mused that they would survive whatever unwanted change man inflicted on the desert. With their wind-scoured black caps of rock, they exuded the bleak monotony of the everlasting.

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*John Hare's expedition had additional sponsorship from the Bradshaw Foundation, the Brownington Foundation, the Royal Geographical Society, and the Society for Libyan Studies. His book *Shadows Across the Sahara* will be published in the U.K. in spring 2003 by Constable & Robinson. A goal of the expedition was to raise funds for the endangered wild Bactrian camel in Asia. See the Wild Camel Protection Foundation's website at [www.wildcamels.com](http://www.wildcamels.com). □*

**ON OUR WEBSITE**

Watch footage from the Sahara trek narrated by John Hare; find ■■■ photographs, tales from the field, and resources and links at [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).



A hero in the making, John F. Kennedy, far right, in command of PT 109 the night a Japanese destroyer struck it. Nearly six decades later a remotely operated vehicle hovers over what is believed to be the wreckage of the famous torpedo boat.




The torpedo boat that became an American legend



The Search for

# P<sub>T</sub>-109

By Robert D. Ballard • Photographs by Ira Block



**W**ell before dawn on August 2, 1943, 26-year-old Lt. John F. Kennedy and his crew on *PT 109* were astonished to see a massive shape appear out of the moonless night in the Solomon Islands. Only seconds later that form became the speeding Japanese destroyer *Amagiri*, and before the Americans could avoid it, the ship rammed the much smaller torpedo boat, igniting a fireball of high-octane gasoline. The impact killed two Americans and left 11 others, including Kennedy, to swim for their lives.

The story of how Kennedy's men survived—and were later rescued from a small island—quickly became a legend of American history. In the 1960 presidential campaign the tale of JFK's heroism in the South Pacific helped persuade Americans to vote for the young charismatic leader.

One key to the events of that fateful night, however, seemed forever lost. *PT 109* was believed to have split into two pieces, the aft starboard section sinking immediately, the bow section floating on for another half day or more before it disappeared. Having found many lost ships in my career, I was confident we could locate her remains. So earlier this year, nearly 60 years after she'd gone down, we went looking for *PT 109*.





About two hours past midnight, as PT 109 cuts her way through the sea, the 40-foot PT is suddenly rammed (1) by the Japanese destroyer *Amagiri*. The impact tears off a fireball and demolishes part of the 40-foot PT bow. Two of the 15 crew members are killed; survivors crowd into the bow section, which remains afloat and drifts southward.

Fearing capture by the Japanese, they abandon the burning PT and make a 10-hour swim (2) to Plum Pudding Island, later called Kennedy Island. Kennedy hauls injured crewman Patrick "Pappy" McMahon to safety, swimming with McMahon's life jacket strap in his teeth. Before dawn, Kennedy swims (3) southeast through Blackett Strait into Ferguson Passage

in an unsuccessful bid to flag down a passing PT boat.

Lacking food on the tiny island, the survivors swim (4) to Olasana Island on August 4. The next day Kennedy and George Ross swim to Naru Island (5), where they find a crate of candy washed ashore and a canister of rainwater.

That evening two Solomon Islanders, seeing no scouts for

Allied forces, including a network of Australian coastwatchers stationed around the islands, make contact with the crew on Olasana. Kennedy later gives the scouts a coconut carved into a message, which they take 38 miles by boat to a naval base in Rendova Harbour.

In the dark early hours of August 8, PT 157 reaches Olasana to rescue the survivors.

# Kolombangara Island



Amagiri route

From Vila, Kolombangara

PT 109 damaged

Blackett Strait

Solomon Islands

PT 109 enters the northern part of Blackett Strait about 9:00 p.m.

PT 109 route

From Naval Rendova Harbour

100 (160 km)

5

New Island

New Britain Island

Peterson passage



## The Hit and Run

On August 2, 1943, PT 109 was on a mission to interrupt a Japanese supply convoy heading to Kolombangara Island. The Solomon Islands were vital to Japan's Pacific strategy to cut off Australia and New Zealand from the U.S.



Area of Control August 2-8, 1943

Blue Allied  
Red Japanese

0 mi 60  
0 km

After two days, with little more than water from coconuts to live on, the crew



Jack Kennedy's early life didn't necessarily point to naval heroism. He'd grown up on the water in places like Hyannis Port, Massachusetts, and had learned to sail at an early age. But like young Teddy Roosevelt, he'd suffered frequent illnesses. He might have chosen an easier path; fresh out of college he'd published his first book,

**MORE ON OUR WEBSITE**

Go behind the scenes of the *PT 109* expedition and find more historic photos at [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).

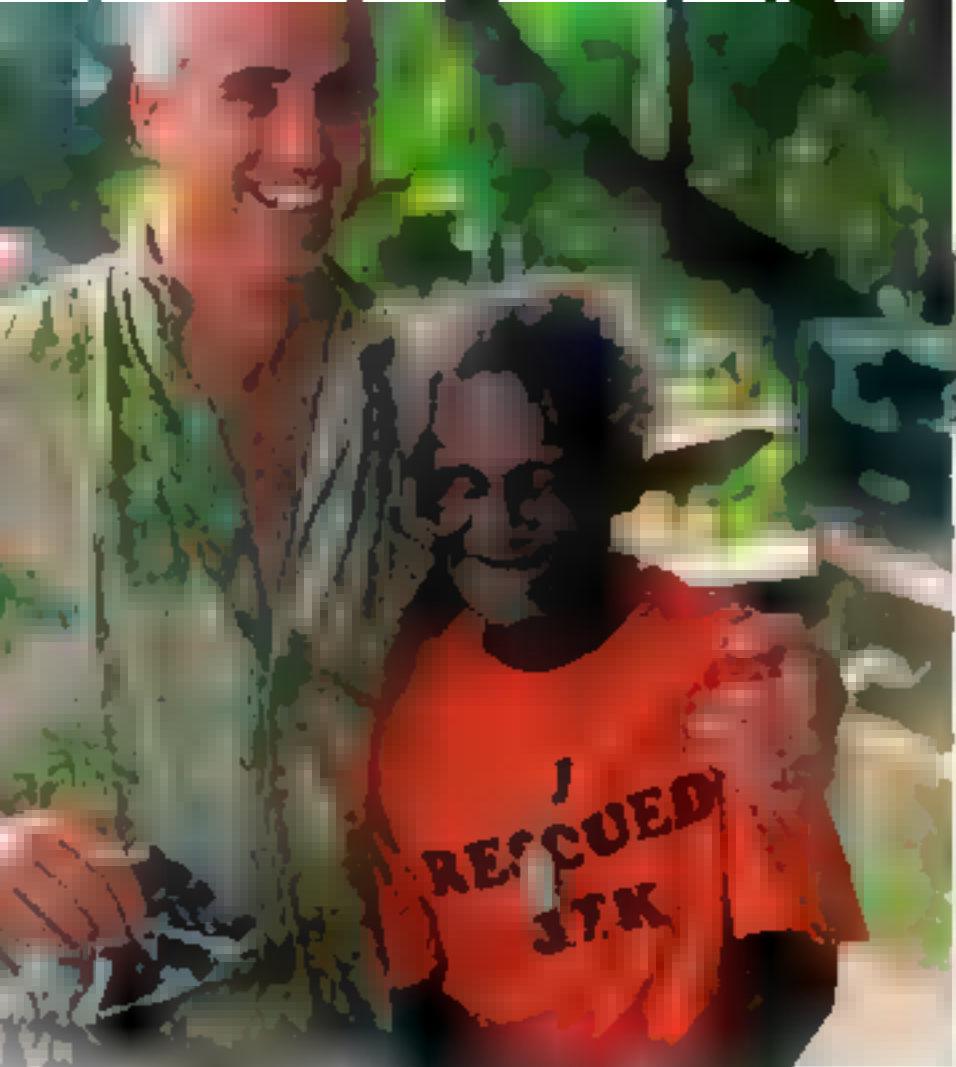
*Why England Slept*, getting good reviews. His father, Joseph P. Kennedy, the former ambassador to Great Britain, was wealthy

and politically connected and could have opened almost any door for him.

But once war seemed likely, Kennedy wanted to fight. In April 1943 he took up his command at Tulaghi off Guadalcanal in the Solomon Islands. His assigned boat, *PT 109*, was already battered by war and tropical climate, but he and his green crew brought her back into fighting shape.

Although the PT boats were fast and exciting, some considered them risky because their hulls bore no armor and were loaded with explosive aviation fuel. Only four of the 15 boats sent out on August 1, 1943, had radar.





**With a grateful heart, Max Kennedy, JFK's nephew, embraces Eroni Kumana (top) and Biuku Gasa, the Solomon Islands scouts who helped save the future U.S. President.**

time before the order was given to race back to Rabaul.

Around 2:30 a.m. Kennedy's lookout saw a ship appear out of the darkness, illuminated by the phosphorescence of its bow wave. JFK and his men had only seconds to react. Kennedy wanted to fire his torpedoes, but he and the crew couldn't get the boat to respond quickly enough. Before they could swing into position, the larger vessel was upon them.

Based on everything we'd learned from accounts of the collision between *PT 109* and the *Amagiri*, we mapped out a 5-by-7-mile grid of Blackett Strait as our primary search area. Our initial strategy was to use our sonar sled *Echo* to look for the "slice," or aft section of the boat, that had sunk instantly. Although it was

That afternoon U.S. code breakers had reported that the Japanese would try to resupply their forces in the area through a "Tokyo Express"—a convoy of fast and dangerous destroyers sweeping south from the huge Japanese base at Rabaul on New Britain. *PT 109* and the other torpedo boats were sent out from their base in Rendova Harbour to harass and interfere with these critical resupply shipments in Blackett Strait off Kolombangara.

About midnight the Express passed near the American PT boats, a number of which fired torpedoes at the speeding convoy. Undeterred, the Japanese continued to Vila on the southern coast of Kolombangara Island and unloaded more than 70 tons of supplies and hundreds of troops in lightning

small and made of wood, it probably still contained engine parts and other metal objects that would show up brightly on sonar.

Within three days we'd marked hundreds of potential targets, including about a dozen that looked particularly promising. We sent our unmanned video vehicles, *Argus* and *Little Hercules*, down on Tuesday May 21, but one target after another turned out to be rock formations or junk. We were losing valuable time, and there were just too many targets.

The next day we changed our strategy and began looking for a profile to correspond with the bow section. We took a big risk here, because previous theories had speculated that the hull had drifted off into Ferguson Passage, outside our search area. But one of the Australian coastwatchers, Lt. Arthur Reginald Evans, reported seeing wreckage still drifting south in Blackett Strait on the morning of August 2—after which he reported seeing nothing for two days. And sure enough, on May 22, zeroing in on a hull-shaped profile 1,200 feet below the surface in an area with no other targets, we peered through our TV camera at what appeared to be torpedoes or torpedo tubes.

On Thursday May 23 we were joined by Dick Keresey, former commander of *PT 105* who had also been on patrol in Blackett Strait the night *PT 109* went down, and Max Kennedy, son of JFK's brother Robert. We reran our tapes from the bottom. Although we couldn't read definitive markings on the wreckage, it looked like the real thing. We double-checked our records, making sure that no other PT boat had been lost in the area except for *PT 109*. Weeks later our hunch was backed up by Navy scholars who closely examined our video images (facing page).

Before we left the Solomons, Max Kennedy presented gifts and a family donation to Biuku Gasa and Eroni Kumana, the two island scouts who had carried out messages from JFK and his crew that led to their rescue. Now proud great-grandfathers, the two men wept from the emotion of the moment, and the rest of us felt incredibly lucky as well. Despite long odds, our expedition had added a missing chapter to the history of an American icon.

The key to our search was to calculate how far the hull had



## The Discovery

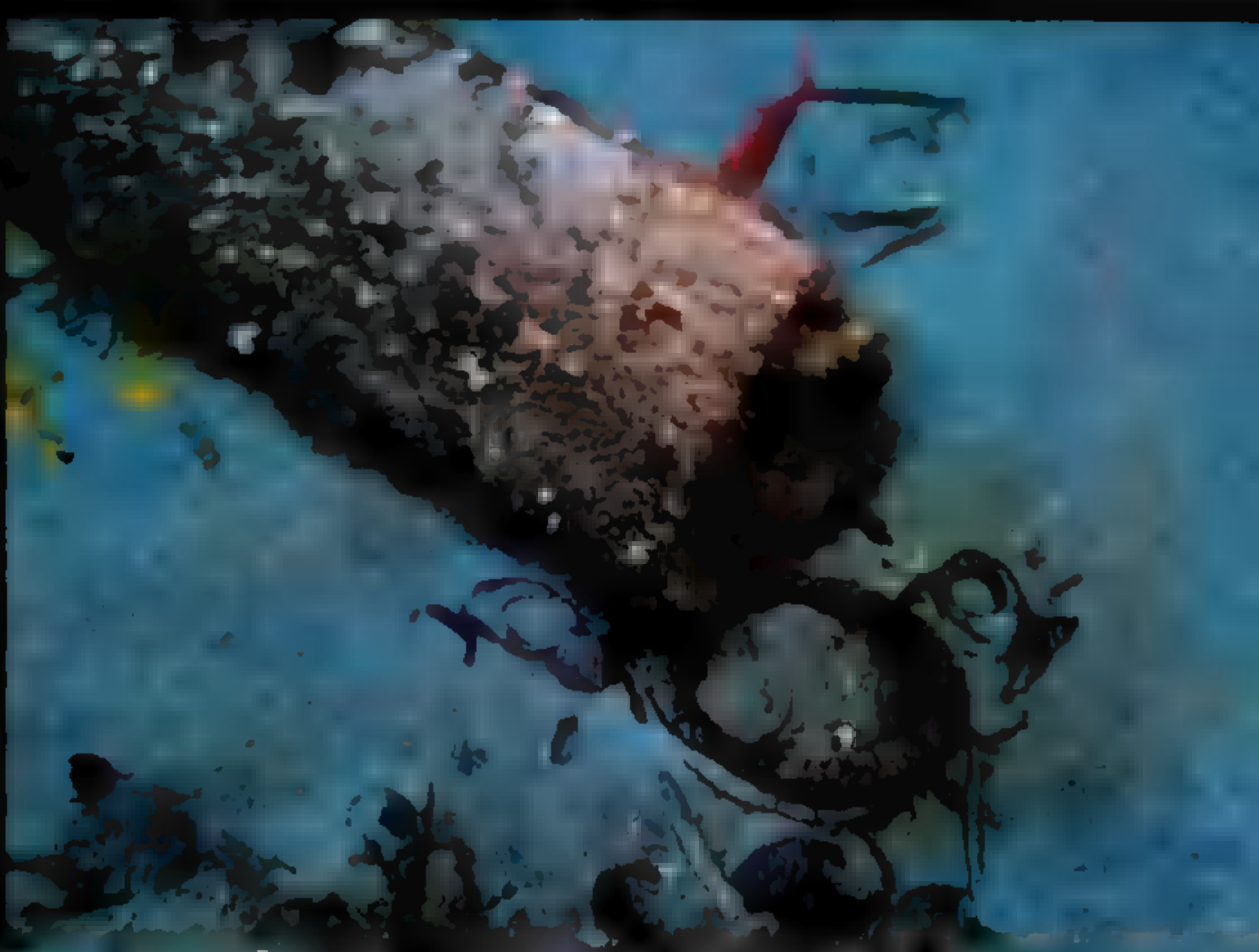
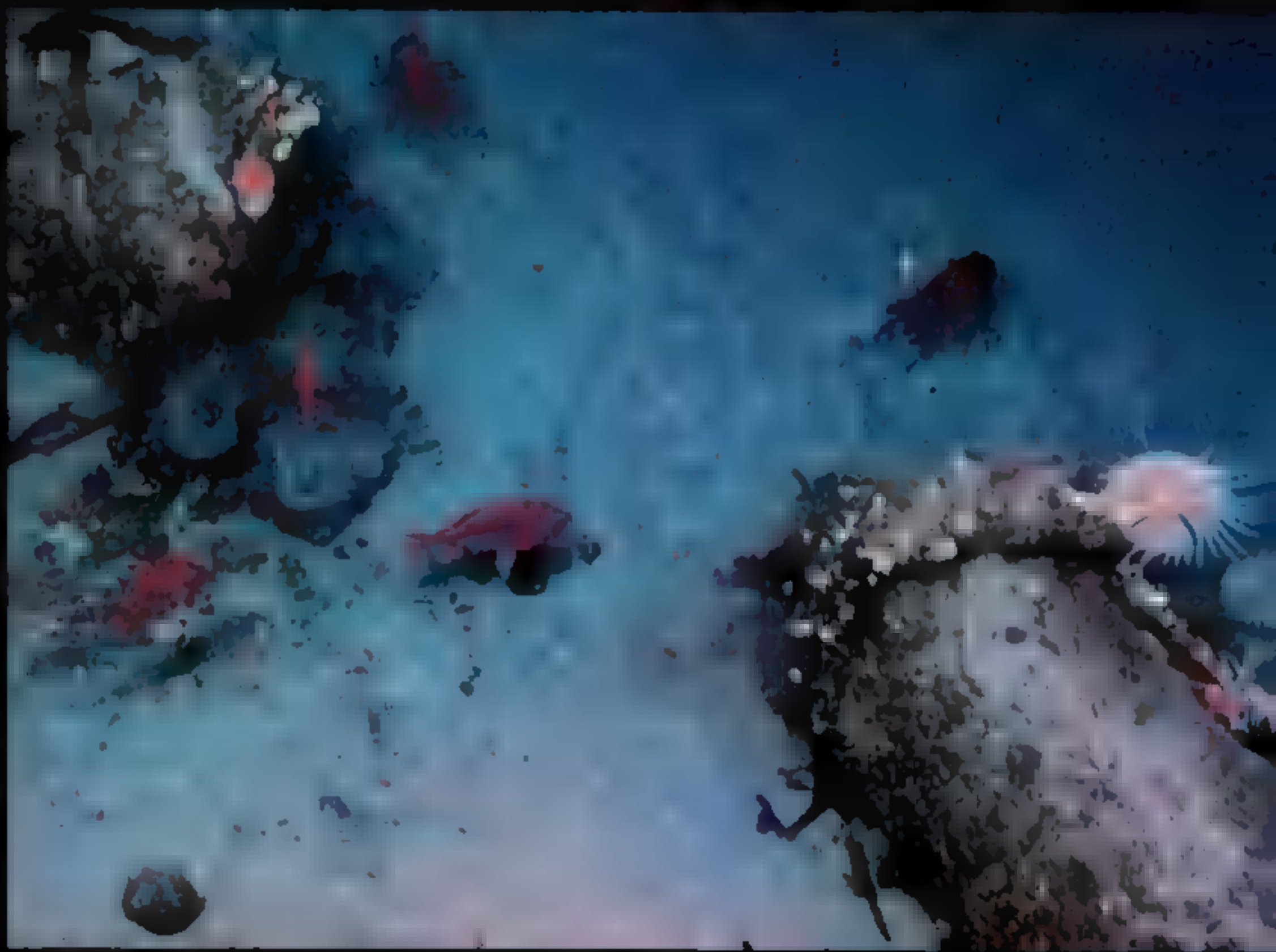
After we used side-scan sonar to identify the most promising targets in Blakett Strait, we lowered *Little Hercules* (right), an unmanned vehicle with searchlights and a high-definition TV camera. Diving as deep as 1,500 feet, *Little Herc* encountered strong currents and shifting dunes as we checked out objects on the bottom. It felt like we were searching in the Sahara during a sandstorm.

On day two our patience paid off. We spotted what we later learned was a torpedo (center, at upper left) and a torpedo tube (center, at lower right). "This is it," shouted Dave Rouse, a weapons consultant. We couldn't tell if the tube was still attached to the deck, possibly buried in the sand below. In keeping with U.S. Navy policy, and out of respect for the dead, we left the site undisturbed.

Back in Washington we showed our video images to Mark Wertheimer and Claire Fisher of the Naval Historical Center and Welford West, a former torpedoman on *PT 157*, the boat that rescued JFK's crew. They identified the objects as a Mark 8 torpedo—the type used by PT boats in 1943—and a Mark 18 torpedo tube (bottom). This was clear evidence for me that we'd found *PT 109* at last.

### ■ SOCIETY GRANT

This Expeditions Council project was supported by your Society membership.



# My Brother Jack

"I've got something special here," Jack said with a laugh, "and you get first choice!" There, laid out before my widening eyes, was a collection of colorful Solomon Islander war clubs. They were at least four feet long, and as any 11-year-old would be, I was fascinated. An even bigger thrill was that my brother was letting me be the first to pick one out for myself. He had brought the exotic clubs back from the South Pacific, where he had been serving with a PT boat squadron during World War II, as the commanding officer of *PT 109*.

Jack had just arrived at our home in Palm Beach, Florida, after the long trip back from the Solomon Islands. On the way he had made a short stop in California to see friends and rest. While there, he had met with the wife of "Pappy" McMahon, the injured crewman whose life he had saved after their torpedo

boat had been rammed by a Japanese destroyer. He reassured her that her husband would recover from his injuries and be home soon.

Now, at long last, Jack was home from the war front. We were so glad to see him and so proud of all he had done. In bits and pieces he told us about what he had been through, but I noticed he didn't want to dwell on it. He talked to my father about helping the families of the two crew members who had been lost and made sure assistance was provided over the years. He seemed older to me, and all grown up, especially in his uniform. He was my hero,



JOHN F. MCGRAW LIBRARY

as well as my godfather, and I treasured the special attention he gave to me. It led to one of my most memorable times with him before he left the Navy.

Because of his experience in the Pacific, Jack was assigned to be an instructor in the PT boat training program in Miami. One day he asked if I'd like to go for a ride, and the next thing I knew, he had smuggled me aboard one of the PT boats at the base. With the engine roaring, we raced across the waves. He introduced me to the crew and showed me what it was like to stand at the helm. I also learned you have to watch where you walk when you're around Navy seamen spitting chewing tobacco. I'd never seen anyone do that before. Suddenly I had a shirt-front full of it, which everyone else thought was very funny, but I smelled like tobacco for the rest of the day.

I was in awe of Jack's medals, but he valued the friends he'd made in the Navy more. He often invited someone from the base to visit for the weekend. As they were getting ready to go out for the evening, he would ask me to go to the guest room and deliver a message to his friend. It would all be in Navy slang. Then I would bring a response back to him. It greatly amused him that I carried messages back and forth all weekend and never understood a thing they were saying.

Jack's combat injuries had aggravated his bad back. In the spring of 1944 he had to have an operation. He was enormously cheered during his recuperation by visits from his former shipmates. Later in the summer he invited George "Barney" Ross, Leonard Thom, Jim Reed, and Paul "Red" Fay to visit Hyannis Port. It was a happy weekend reunion full of spirited football games, laugh-filled outings on our sailboat, and boisterous storytelling. In the evening we all sang Irish songs around

**Back home in Hyannis Port, Massachusetts, Kennedy hosted some crewmates at his family's estate. He thrilled little brother Ted, squatting, by giving him a Solomon Islands war club (above), still a treasured memento.**

the piano with my grandfather "Honey Fitz."

When Jack decided to run for Congress in 1946 his Navy friends were among the first to rally to his side, and they helped in his 1960 presidential campaign as well. During the Inaugural Parade, his happiest surprise was seeing his old crew waving to him from the deck of a substitute *PT 109*.

Like all the young men who had fought in WWII, my brother's war service was a defining experience in his life. He had coped with fear and danger and death. He had been tested, and he had found within himself the courage to prevail. He had become a leader and had grown and matured. He had been



under enemy fire, so he took the hardships and combat of an election campaign in stride. His war record gave him credibility and the respect of his fellow veterans, and the experience of leadership and loss gave him an instant connection to the many families that had suffered too. The Gold Star mothers understood how deeply Jack empathized with them, for they knew our family had lost my brother Joe—and our mother was a Gold Star mother too. They supported Jack as if he were one of their own.

Jack represented a new generation of leadership. His war experience established him as a patriot and prominent figure in his generation. It had taught him the terrible price of war. He believed that in serving in the Congress, where war is declared, and later in the White House, where it is commanded, he would be in the best possible position to help prevent it.

Not a day goes by that I don't miss him. And I think of *PT 109* each time I sit in my den and look at the family pictures and mementos surrounding me. On the wall is the greatly treasured war club Jack gave me so many years ago. I have always kept it. My mother marked the one I chose with a little white tag. She wrote on it, "Teddy from Jack." The tag is still there. □

Lofted balls reflect the buoyant spirits of students at Lyana Malalai, a newly reopened high school for girls in Kabul. Says one woman who lives in the city: "We won't be turned back again."

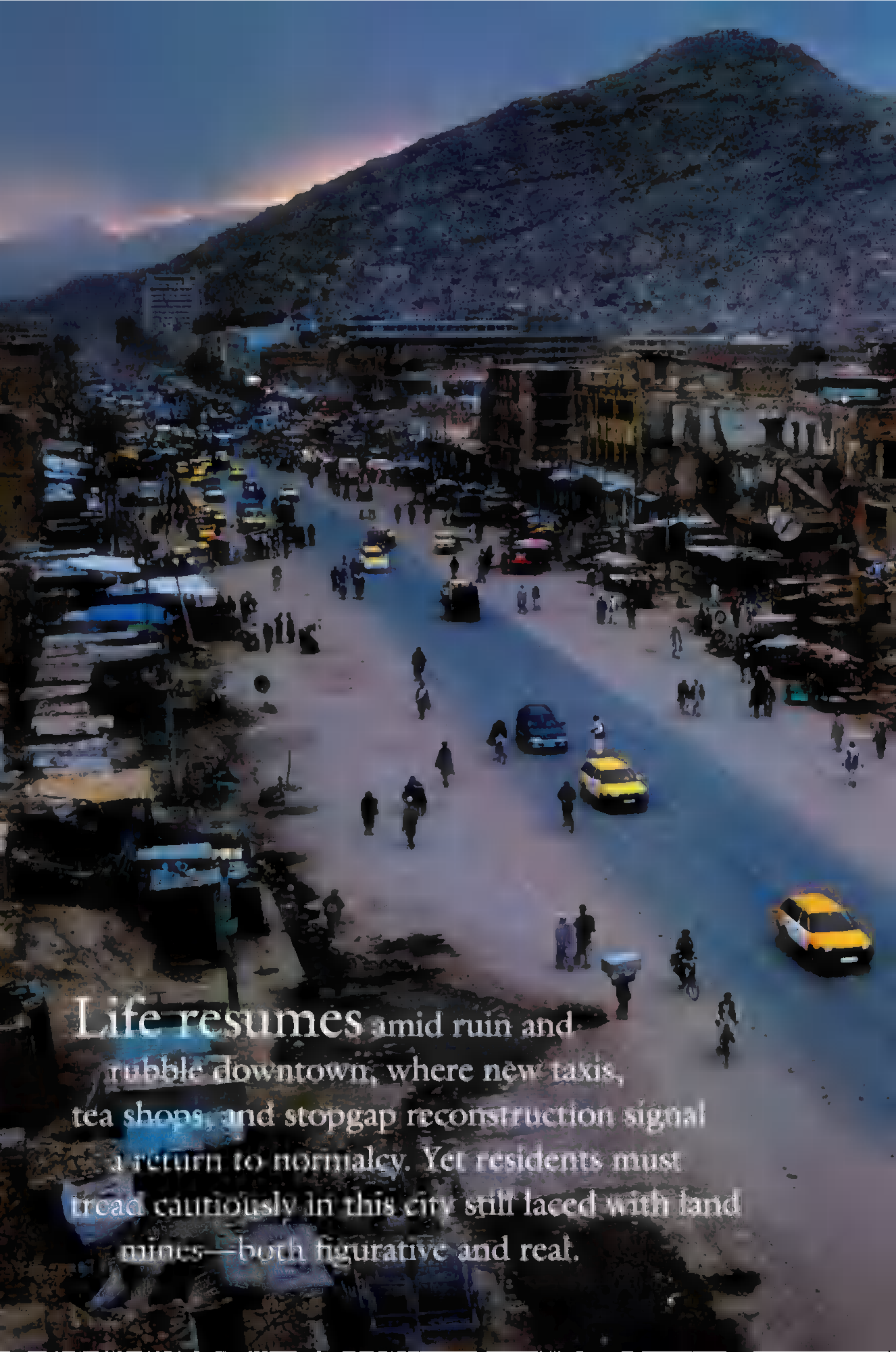
A New  
Day in

# Kabul

After 24 years of war, Afghanistan's capital

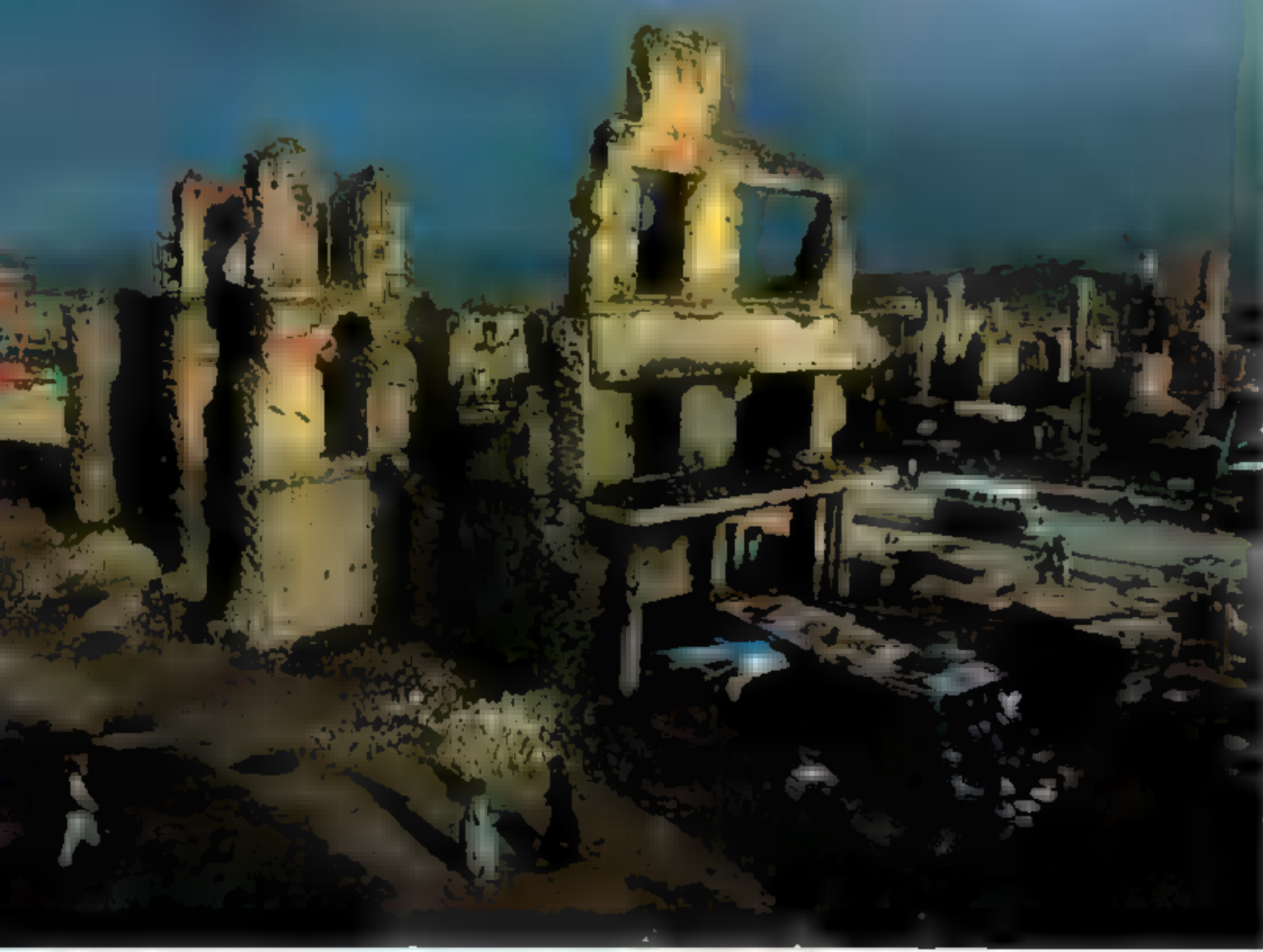


is breathing free, Can its fledgling recovery last?



Life resumes amid ruin and rubble downtown, where new taxis, tea shops, and stopgap reconstruction signal a return to normalcy. Yet residents must tread cautiously in this city still laced with land mines—both figurative and real.





**COST OF CONFLICT** Teetering remnants of war give southern Kabul a distinct Dresden look. Though little damaged in the Soviet occupation of the 1980s, the city was devastated during internecine strife among rival guerrilla groups between 1992 and 1996. Yet in the shadows of shattered buildings, tarps rise over families returning after years away as refugees, and merchants set up shop. Commerce thrives in the less heavily hit Deh-Afghanan commercial district (below), where a street vendor sells fresh yogurt.





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he former resistance fighter smiled wearily and gestured to the sparsely furnished living room of his Kabul home. “We have to build everything from scratch,” he said. “So much has been destroyed. But things will now be good. *Inshallah*—God willing.”

Like many Kabulis, Agha Gul—an old friend of mine from the 1980s, when I was covering and he was fighting the Soviet occupation—had lost his home several times during the various conflicts that ravaged Afghanistan over the past 24 years. From a bloody coup in 1978, to the Soviet war, to bitter factional fighting in the early 1990s, through stifling Taliban rule, the nation has known only hardship, with many of its towns and cities turned to ruins. Now, for the first time, I felt a genuine sense of optimism for the future. Kabul is finally beginning to live again.

The bazaars throng with merchants, returned refugees, former fighters, and farmers. Music blares from packed *chaikhane*, or teahouses, many of which sprout satellite dishes for television sets perpetually tuned, it seems, to the highly popular Indian movie or music channels previously banned under the Taliban. Shop stalls brim with imported goods ranging from Russian refrigerators and tires to Chinese teapots, as well as the latest CDs and DVDs at black market rates of barely a dollar each. On the outskirts of town, food markets overflow with produce, while nomads bring in their camels, sheep, and goats for sale.

Perhaps the most encouraging sign of the city’s rebirth is the recent reopening of its schools, particularly the girls’ schools, closed under the Taliban. Throughout the city, students, who attend class in shifts because of their overwhelming numbers, troop from class to home, many clutching plastic “Back to School” UNICEF bags. In backstreets and empty lots Afghans indulge in soccer and even cricket, imported by refugees from Pakistan. Many men have shaved their beards or keep them fashionably trimmed, while office workers increasingly wear suits and ties, expressing a form of modernity not seen in decades. In public most women still wear a full-length blue or gray *chadri*, or burka, either by choice or for fear of a fundamentalist backlash. Yet a determined and growing group of women, mainly educated professionals, now dare to be seen in long dresses with shawls carefully wrapped around their heads and shoulders—and with their faces free.

Freedom quickly translates to chaos on Kabul’s streets, now clogged with yellow-and-white taxis, UN four by fours, and the military vehicles of international security forces. Uniformed policemen struggle to direct heedless drivers, often leaping into traffic to slap miscreants amid a slew of invectives, much to the amusement of jeering bystanders.

The onslaught of new cars, hotels, businesses, and investment is part of a recovery fueled by the enormous international presence, which is







### POWER SHIFT

With crisp uniform and clean-shaven chin, an officer represents Afghanistan's new army. The military is led by loyalists of the Northern Alliance, which helped defeat the Taliban a year ago. Its long-time head, Ahmad Shah Massoud, was assassinated on September 9, 2001. Hailed as a hero in Kabul, his image is everywhere, even on rugs (right). This cult status angers some Afghans, who charge Massoud's followers with dominating—and corrupting—the new government.

flooding Kabul with money, jobs, and a sense of security. Yet this presence is also creating an artificial environment of inflated salaries, rents, and expectations that cannot last—and that may obscure the city's very real challenges.

One only need stand on the mountains overlooking Kabul to grasp the extent of the damage inflicted by war. Entire quarters consist of little more than crumbling walls and collapsed roofs. Factories lie destroyed, warehouses have been looted down to the door frames, and red flags mark the suspected presence of hidden land mines and unexploded ordnance. Other, more insidious, dangers remain: Recent terrorist attacks in Kabul and elsewhere prove that political violence is an ongoing threat. Also, as returnees pour in, the city's population is soaring—estimates range from 1.5 to 2.5 million people—and Kabul is barely able to cope. Sewage is simply dumped into water channels, polluting wells. Water shortages, poor hygiene, and piles of garbage are boosting the dangers of cholera and dysentery. Leishmaniasis, an ulcerous skin disease, has become epidemic.

And yet the most immediate impression one has on arrival in Kabul is of exhilaration and confidence. Much of this stems from the holding of the Loya Jirga, or Grand Council, in June, which signaled for most Afghans the beginning of a new era with the election of a broad-based interim government. And though many Afghans, particularly Kabulis, regard the Loya Jirga as rigged, they also view it as the first time in decades that ordinary Afghans were able to express themselves openly.

For countless Afghans Kabul's renaissance represents a golden opportunity that cannot be squandered. I heard this voiced by Lateef Khalid, a 40-year-old teacher who was preparing to return to Kabul after spending 20 years in Pakistan. "If we don't resolve our problems now," he said, "then we will have missed a chance that may never come again."





**OUT OF HIDING** Posters of popular Indian film stars and singers—once banned to “prevent idolatry”—reappeared almost overnight in Kabul after the Taliban fell from power. Now theoretically free to wear what they like, many Afghan women in this conservative country still don full-length veiled burkas, either from religious conviction or fear. “The mood is not right yet,” says Shukriyah, a Kabul resident. “Many women ■■■ still nervous. The Taliban were not the only ones to cut back on our rights. Many of those now in power think the same way. It will take a long time to change that.”





**THE RACE IS ON** Horsemen vie for a calf's headless carcass in this rough-and-tumble game of *buzkashi*, ■ traditional Afghan sport. This match, along with a parade of body-builders (top right) and other athletes, was part of ■ recent celebration marking the tenth anniversary of the end of communist rule. Discouraged or banned by the Taliban, sports are enjoying a comeback: Afghans aim to excel in wrestling during the 2004 Summer Olympics. Women who hope for greater independence are starting businesses such as beauty parlors (right), often with funds from international aid agencies.



**Flush with freedom,**  
Kabulis again display the pride and competitive spirit that has enlivened and sustained this ancient culture.





#### ON OUR WEBSITE

Learn how international photographers, writers, and filmmakers are helping Afghans create independent media

■ [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).

**LOOKING UP** A young boy surveys ■ rapidly reviving Kabul, unimaginable only a year ago. Watched over by novice policemen in white caps—many of them former guerrilla fighters—taxis wait for customers at one of Kabul's bustling bazaars. Returning from Pakistan or Iran and eager to start new businesses, refugees often turn the family car into ■ taxi. With this flood of returnees, Kabul suffers a critical shortage of teachers and schools. Sitting attentively in ■ roofless classroom, students are hungry to learn again—the greatest hope for Afghanistan's future. □









# Muscle & Magic Snowy OWLS

They're power tools, the impact on the tundra,  
fast and fierce enough to knock a grizzly bear to the ground.  
Even a clumsy chick (new class) can flash an intimidating  
yellow stare. Researchers who want to learn how snowy owls  
live and breed have to face down some of the  
toughest birds in the Arctic.

By LYNNIE WARREN  
NATIONAL GEOGRAPHIC WRITER

Photographs by DANIEL J. COX





With hungry **adults** making **unmistakable** demands,

a **female**, below, relies on her mate to deliver a **steady** supply of prey.

**First** **hunger** **lemmings**. To support their brood and themselves,

a **pair** of **snow** **owls** must capture **thousands** of lemmings during the **breeding**

**season**. **May** is **mid** **summer**. The **abundance**—or **scarcity**—of this **two** **main**

**rodent** directly affects how **many** **owls** **reproduce**,

and **how** **many** **young** they **raise**.





S

cientists know just a few places where snowy owls breed regularly: Barrow, Alaska, is the only one in the United States. Perched between the Chukchi Sea—thick with ice even in July—and the hummock-and-pond vastness of the tundra, Barrow (above) has a population of roughly 4,600 people and serves as the municipal center for the state’s huge oil-rich North Slope Borough. A decade ago biologist Denver Holt, founder of Montana’s Owl Research Institute, came here, drawn by the “mythic lure” of big white birds. Though many individual snowy owls winter on the Great Plains of the U.S. and throughout Canada, to observe *Nyctea scandiaca* in significant numbers, Holt says, “You have to come to Barrow.”

Much of his summer fieldwork has focused on links between owl reproduction and lemming numbers. But as Barrow homes and businesses have expanded into snowy owl habitat—like the natural gas pumping station within sight of a nestful of chicks (right)—Holt has become increasingly concerned with owl-human relations. “There’s a long history of the native Inupiat people and owls living together here,” he says. “The question is, will those traditions continue to be respected? Will Barrow make choices that work for people *and* owls?”

### Snowy Nomads

The first snowy owls tracked by satellite returned dramatic results. One (route in brown) sprinted across more than 800 miles of [redacted] in just 11 days. Another (route in blue) flew [redacted] average of 40 miles per day for 48 days on [redacted] 1,800-mile trip from Siberia to Canada.







Their range is so big, so inaccessible — we don't







## really know how many snowy owls there are.

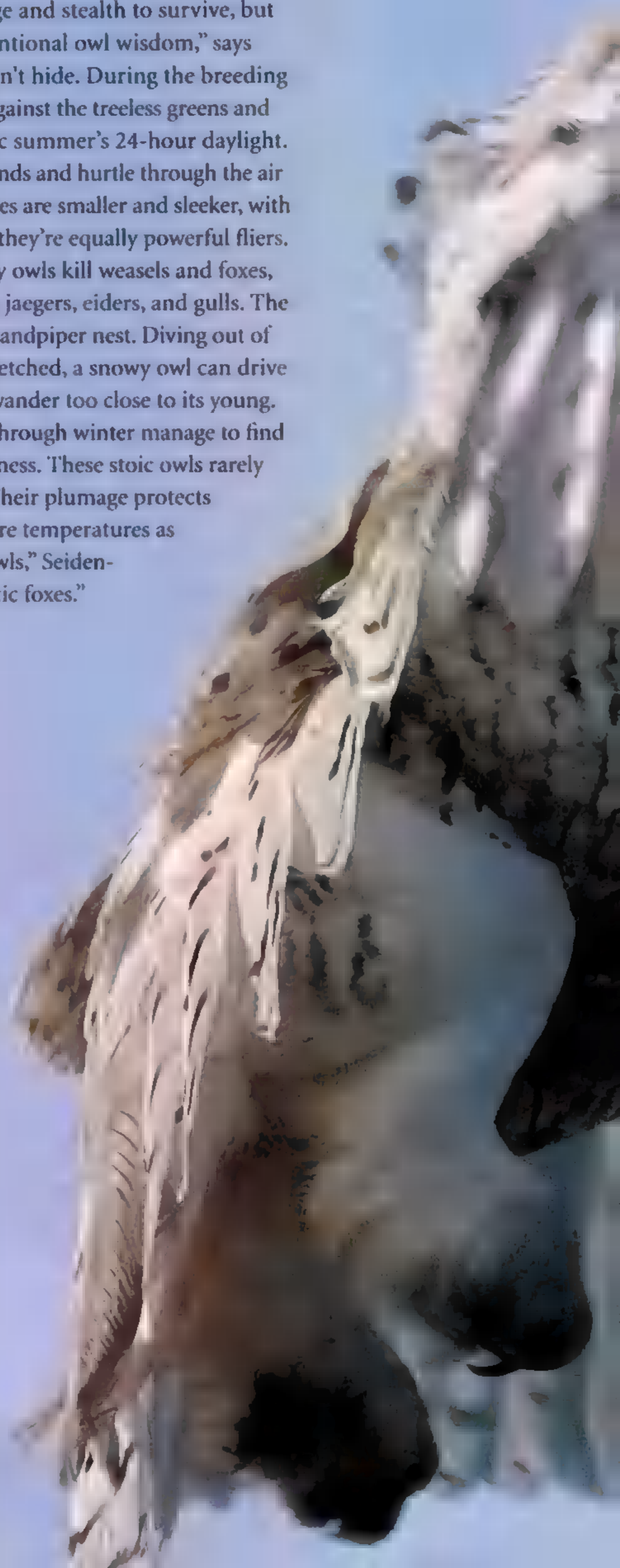
Where do snowy owls go when they leave summer breeding grounds? Tested on Barrow owls, a new satellite tracking system—using transmitters that weigh about an ounce and record data for more than a year—reveals that individual birds range through as much as a third of the Arctic. But before Holt’s Owl Research Institute team could start collecting data, owls had to be caught. Dodging a snapping beak and sharp talons (lower left), Holt and colleague Laura Phillips gently untangled a female from a lemming-baited trap, then fitted her with a transmitter backpack. After release (above) tagged birds preened, then



flew undisturbed by the device’s antenna (right), and rejoined their chicks. “We’ve worked on adults and young from 142 nests,” Holt says. “Handling causes some stress, but we’re extremely careful. Our research has never caused an owl to abandon a nest.”

Most owl species depend on camouflage and stealth to survive, but “snowy owls seem to defy all the conventional owl wisdom,” says researcher Mat Seidensticker. “They don’t hide. During the breeding season they’re flashing white beacons” against the treeless greens and browns of the tundra, hunting in Arctic summer’s 24-hour daylight. Adult females weigh as much as five pounds and hurtle through the air on wings more than five feet across. Males are smaller and sleeker, with a top weight of about four pounds, but they’re equally powerful fliers. Lemmings aren’t their only prey: Snowy owls kill weasels and foxes, and even feed on other birds, including jaegers, eiders, and gulls. The female at right snatched a chick from a sandpiper nest. Diving out of the sky with long legs and talons outstretched, a snowy owl can drive away humans, dogs, even caribou that wander too close to its young.

Birds that remain in the polar north through winter manage to find food despite three months of total darkness. These stoic owls rarely seek shelter, even from roaring winds. Their plumage protects them so effectively that adults can endure temperatures as low as 40 degrees below zero. “Snowy owls,” Seidensticker says, “are as well insulated as arctic foxes.”







The most aggressive parents — master hunters and



The pure white feathers of a male delivering a lemming to his mate (left) do more than keep him warm. They also show that he's fully mature. Males don't lose the gray-brown banding that marks females and juveniles until they're three to four years old, and rarely breed before that. In years of peak lemming abundance, Holt and his team have observed older, highly aggressive males establishing nests with two different females. They hunt for both, and protect two territories that may each extend a half mile from their central nest mounds.

Bloody from tearing a freshly caught lemming into tiny mouthfuls, the female below fed each of her offspring in turn. Females typically lay eggs two days apart; chicks hatch at roughly the same interval. In a clutch of six or seven eggs, the first chick hatched may be two weeks old before its youngest sibling emerges. "We've seen no signs of competition or favoritism in the nest," Holt says. "Snowy owls nurture all their chicks, even the smallest."


*Harry Potter* novelist J. K. Rowling cast a snowy owl as her orphaned hero's courier and companion. That seems perfectly fitting: Swift, strong, beautiful, and dauntless in caring for their young, these winged icons of the Arctic are magically fascinating—to boy wizards and scientists alike.

**MORE ON OUR WEBSITE**

Slog [Alaska's tundra](#)  
at [nationalgeographic.com/ngm/0212](#), and meet [some](#)  
of these captivating "power  
owls" face-to-face.

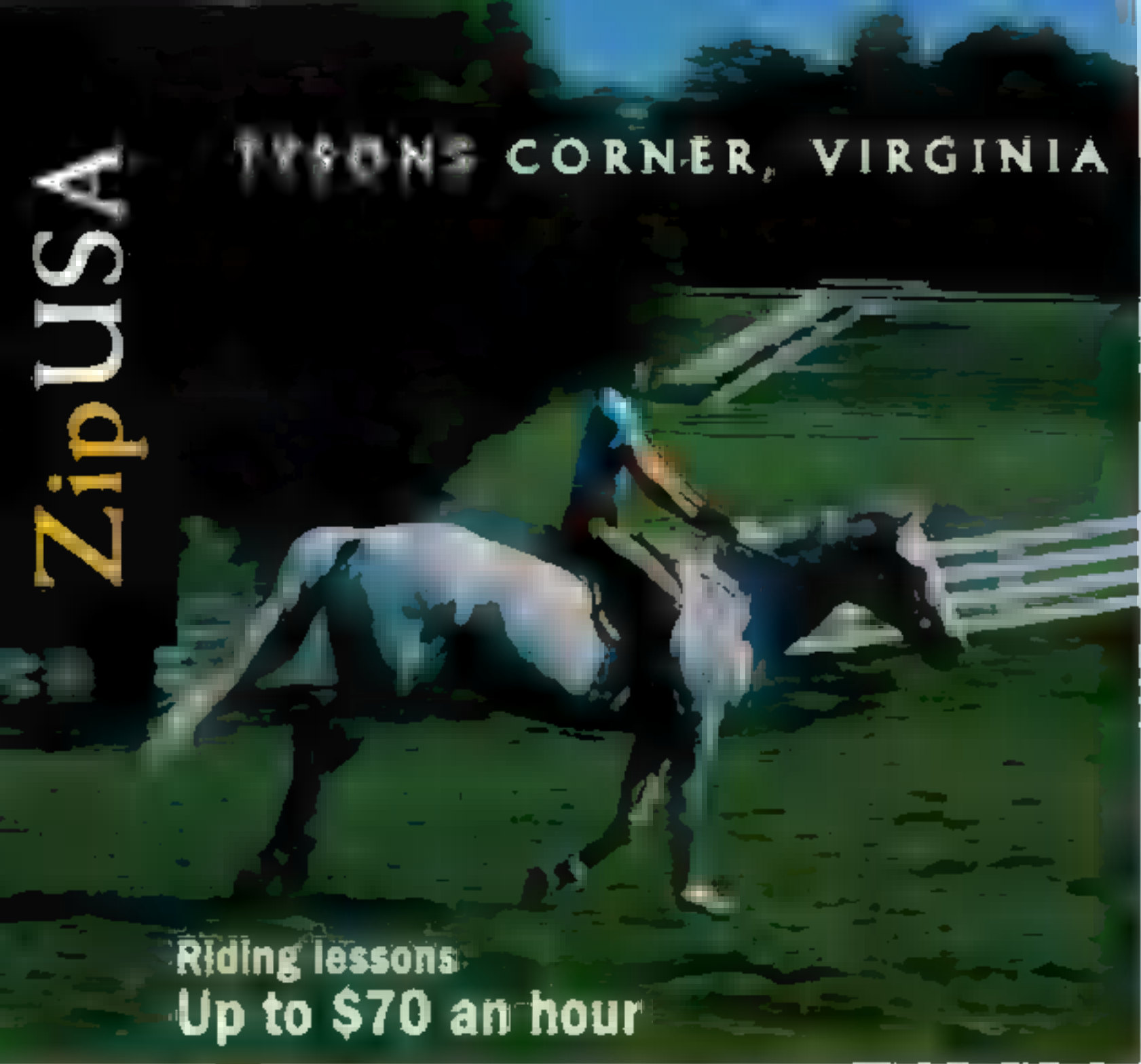
brave guardians—raise the most chicks.





Peering at the world between cotton grass billboards,  
this four-week-old has already left the nest. Parents keep close watch and  
provide regular food deliveries until chicks are eight to nine weeks  
old and can fly and hunt on their own. By the time such bright-eyed fluff-balls  
become fully fledged, the brief Arctic summer is ending, and  
most of Barrow's snowbirds disperse to face  
winter's icy challenge—alone. □





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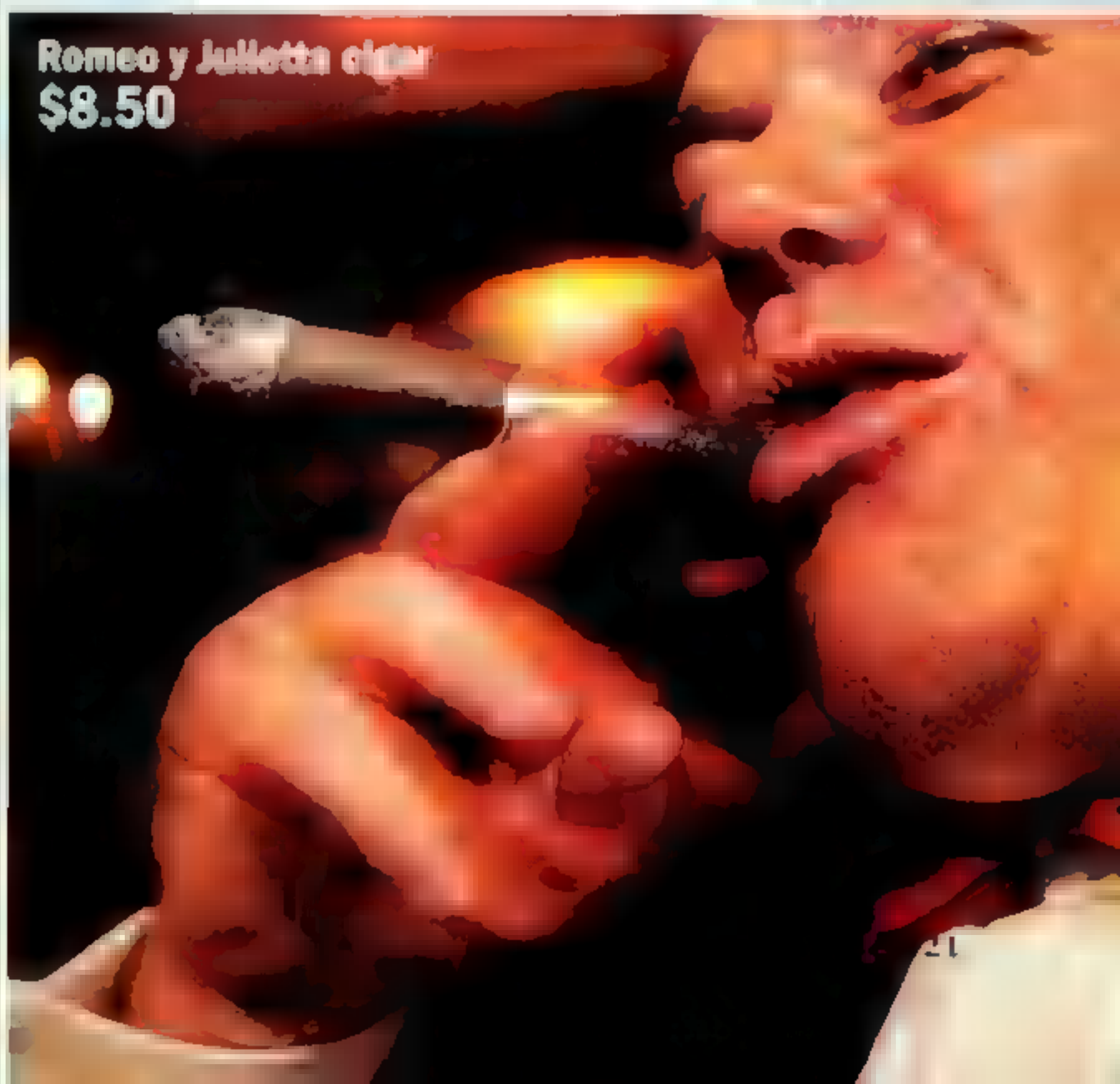
# Booming in the Bust

# 22102



Retail rent per square foot  
\$55

BY GLENN GARELIK  
PHOTOGRAPHS BY AMY TOENSING



Romeo y Julietta cigar  
\$8.50

**POPULATION:** 18,600

**SHOPPERS IN TYSONS**

**CORNER CENTER AND**

**TYSONS GALLERIA**

**DURING HOLIDAY PEAK:**

More than 115,000 ■ day

**PARKING SPOTS, BOTH**

**MALLS:** 15,500 plus

**YEARLY SALES VOLUME,**

**BOTH MALLS:**

More than \$730,000,000

**UNEMPLOYMENT RATE:**

Around 3 percent

**PUBLIC PARKS IN THE**

**ZIP CODE:** 13

**“It’s a fad** I never thought would last,” says Charles “C. D.” Walsh of the heavy cigar smoke in the mahogany-paneled steak house where he tends bar in Northern Virginia. “But it hasn’t dropped off in the least. I guess black lung just goes with the territory.”

The territory is the upscale Palm restaurant, where despite the crash-and-burn of many once hot local dot-coms, business remains strong. So it is in the rest of Tysons Corner, an intense agglomeration of stores, office buildings, and hotels 12 miles west of Washington, D.C.

Once Tysons was nothing more than a general store at the junction of a couple of farm-to-market roads. Today it is a megamall, as well as the capital of a bruised but not bowed high-tech corridor that runs from there 14 miles west to Dulles Airport. Tysons increased its resilience in the nineties by buttressing its retail core with corporate offices. Soon after, big information-technology and defense firms attracted services, managerial support, and swarms of developers, financiers, and lawyers. By the end of the decade tech businesses had created tens of thousands of jobs. Even with recent layoffs, Tysons continues to thrive because diversification and boom times for the defense industry have absorbed some of the economic shocks suffered elsewhere.

“The Washington area used to be the quintessential government town,” says Bobbie Kilberg, president of the Northern Virginia



Real estate sales in year 2001  
**\$132,000,000**



1939 price per acre  
**\$100**

Technology Council. “But our entrepreneurial spirit was emboldened by the economic boom, and the bust hasn’t taken that away.”

Part of the area’s armor is the northern tier of zip code 22102: In contrast to Tysons, this graceful swath of real estate is residential, even rural, bordering the wild gorges of the Potomac River. Here you find a national park, horse farms, old-money mansions, and the 376-acre campus of the exclusive Madeira School for girls.

It was this proximity of wealth that gave bullish retailers the confidence to venture into an undistinguished tract of farmland in the early sixties. That’s when a D.C. native named Ted Lerner saw the future as Dulles Airport opened on virgin land 14 miles west and work on the nearby Capital Beltway neared completion. Lerner imagined a shopping

**Sleepy Tysons Corner has been overwhelmed by Washington, D.C., suburban sprawl, creating fertile ground for realtors Sue and Jerry Huckaby, who do brisk business despite a sluggish national economy.**

S. R. [REDACTED] PHOTOGRAPHIC ARCHIVE, FAIRFAX COUNTY PUBLIC LIBRARY (ABOVE)

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## TYSONS CORNER, VIRGINIA

Eden—safe and well-ordered, under towering palms and fanlike cycads. He bought as much land as he could and in 1968 opened a huge covered shopping mall he called Tysons Corner Center.

At 2.1 million square feet and more than 250 stores, the mall remains the largest in the Washington area and among the largest in the nation. Last year it logged more than 20 million shoppers—an average of 55,000 daily, swelling to more than 80,000 during the pre-Christmas rush.

Mike Graham, a builder from the Tennessee Smokies, has driven up to Tysons to play Santa for 13 years. He has enough perspective to remark that while the shoppers since September 11 appear “better mannered and more forgiving,” the affluence he has observed here over the past decade seems undiminished. “Everyone dresses expensively,” he says. “And their kids still ask Santa for costlier items than they used to—upscale items. As far as I can see, they’re getting them.”

“Tysons Galleria is the Rodeo Drive of the East Coast,” says Doug Thompson, who runs James, a high-end men’s clothier in Tysons Galleria—a second mall of 110 upscale stores that Lerner opened in 1988 across the road from the original. Thompson sells suits with 22-karat-gold pinstripes for \$10,000, but lately, he says, a more sober mood has heightened the demand for suits in the store’s “more conservative” range—from \$1,200 to \$5,000. “I’m selling more of those suits than

■ taste for beef lures a firm’s interns to ■ steak house (left). But which fork to use? Consultant Anna Hart explains the do’s and don’ts of protocol to private clients like James Burke and ■ wife, Ann, both officers in ■ U.S. Marine Corps.



ever—now that a lot of the dot-coms are dot-gones. Whether people have lost their jobs or not, they figure they’re better off now in a good gray suit than in the jeans and T’s they used to wear to work.”

If the days of what he calls “the walk-in, lay down, no-brainer sale” are over, still there are plenty of folks “at the Ritz-Carlton next door who have a rack of clothing wheeled up to their room.”

“The shopping that some of our guests do is phenomenal,” says Ellen Gale, who handles the hotel’s public relations. “A lot of people who could afford luxury before can still afford it now.”

Those guests continue to attend power breakfasts, afternoon teas, and deal-making dinners at Maestro, the hotel restaurant, which has recently hired a well-known Italian chef.

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## TYSONS CORNER, VIRGINIA

But while life for the wealthy appears to be trouble free, that of the daily worker often is not. "You have to get into your car to get everywhere," says Frances Helgans, a product manager at an accounting firm, "whether you want a place across the highway or you just want to go over to the food courts at the mall."

A kindred complaint is rush-hour gridlock, and traffic can only get worse. In the past year the Gannett Company and Freddie Mac have added more than two million square feet of office space. Several more office high-rises are in the works.

To avoid rush hours, some people work out instead at the tony Tysons Sport & Health Club, a huge facility with industrial decor, wood-paneled locker rooms, and valet parking.

Not far away khaki-clad singles throng the eCiti Cafe & Bar, a cavernous former warehouse distinguished by black scaffolding and concrete floors. The walls, which once were covered with billboard-size posters that promoted only neighborhood e-businesses, now include more traditional firms such as Saratoga Water.

There's a bit more breathing room on "hi-tech Thursdays" than a year or two ago, says owner Paul Loukas, and fewer Ferraris in the lot outside. To adjust, he's added "pink slip parties" on Wednesdays and lowered prices for out-of-work techies.

**With decorum fitting the decor, Durdana Shahzad tours a model home in the Reserve, a new subdivision. In Great Falls Park, Afghan refugees find a quiet spot for evening prayers.**



Home model price in the Reserve  
**\$2,000,000**



Prayer in the  
**Tree**

If some of the mid-level hotshots and their paper-only fortunes "have evaporated," he says, he's still doing a good business with the "higher level execs, the people in their 30s and 40s."

Tysons, like Loukas, survives because it's flexible. It still has consulting services, think tanks, and law firms; the old money that made the site an irresistible venture in the first place; and tens of billions of dollars in federally funded defense and intelligence contracts. A 2.6-billion-dollar expansion program is under way at Dulles, and the eight-lane Beltway may be widening to twelve.

That expansion may sound like a prescription for bad air as well as continued big bucks.

But that comes with the territory. □

### MORE INFORMATION

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# Final Edit



HAWAII: PRESERVING THE BREATH

## Dance of Life

It began with singing. Then Hawaiian studies teachers Linda Pacheco, left, and Harriet Daog, center, broke out ukuleles. "I couldn't resist," says their friend and colleague Sabra Kauka, right, "so I got up and started to dance."

That's one side of *hula*: a spontaneous display of joy. But there's another, more measured form, reserved for special occasions, like Sabra's tribute to Pepito Makuaole, a *kupuna*, or elder, on pages 22-3.

In the end the hula for Pepito was selected for the story. "This photograph of the ladies in the cottage carries a kind of delight. It's comfort food," says photographer Lynn Johnson. "The other photo captures what Sabra is all about: reverence for the *kupuna* and reverence for the past."

### MORE ON OUR WEBSITE

Cut it or keep it? Find out what tipped the balance for this photo at [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).



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# ON ASSI

ON THE ROAD, IN THE FIELD,

SAHARA CROSSING

## Portrait of an Ornerly Friend

*Photographer finds camel has mind of its own*

Some days, photographer **Carsten Peter** says, this was “the nicest camel I could want.” Other days, “it was in a bad mood and wouldn’t cooperate. It wouldn’t sit or stand or go or follow—it would do just contrary to what I wanted.”

In his 20s Carsten had traveled the Sahara on a motorbike. Crossing the desert on a camel’s back this time was better.

“I enjoyed getting so close to an animal,” he says. But Carsten’s camel (everyone called him Percy) died after the trek’s most stressful stretch. “Our camels were full members of the team,” he says, “each with its own character. It was very sad, like losing a good friend.”



# GOVERNMENT

C O V E R I N G T H E W O R L D





## SNOWY OWLS

## Shooting Blind

*Gain outweighs pain, but don't mess with parents*



TANYA COX (TOP); DAN COX (LEFT)

Here's photographer **Dan Cox's** four-step guide to shooting snowy owls on the Alaska tundra: Pack a sandwich. Wear netting over your head to fend off ferocious mosquitoes. Set up your portable blind (above). Then sit inside, watch, and wait for 12 to 14 hours at a time. "As I get older, my back tends not to like it much," he says. "You come out like a knotted-up ball." Even so, Dan says, working in a blind is one of his favorite parts of photography. "You have a secret window on life," he says.

Author **Lynne Warren** recalls

that the blind also shielded Dan against the parka-shredding talons of protective adult owls. While checking nests one day, wildlife biologist Laura Phillips set a chick on Lynne's hand (left). "It was so fluffy and warm," Lynne says. "It was hard to resist the impulse to pet it and make cute, cuddly noises." But the chick's parents swooped around, screeching loudly. "They're watching us as if they're trying to decide: 'OK, which human do we attack first?'" says Lynne. "And this little bird is giving me this look that says, 'Oh, my mother is so going to get you!'"

## WORLDWIDE

In the days of Taliban rule, says author **Edward Girardet**, residents of Kabul "always looked over their shoulder" when they dared talk to journalists. Today, says Ed, a longtime Afghan hand, "people are eager to talk, and they give their names." Still, there are downsides to the end of Taliban rule: Prices have skyrocketed and traffic jams are common. One constant is the problem of unexploded ordnance. Many areas remain heavily mined, and garbage dumps are dangerous. "There are buried grenades just outside the office of the media foundation where I'm a director," he says.

When author **Glenn Garelik** received his first assignment for the magazine, he thought, "I'll be Indiana Jones, put on khakis and a fedora." Then he found he was going to a shopping mall just 12 minutes from his home in suburban Virginia for this month's ZipUSA story. Glenn says he's no mall rat. At first he found Tysons Corner an alien place. "But before I knew it, I looked forward to spending long days there," he says. "My life as a reporter is often very solitary. But in the mall I was surrounded by people, by crowds, by every language in the world. I found myself starting to become addicted to it."

**Richard A. "Rik" Cooke III** may be a fifth-generation resident of the Hawaiian island of Molokai, but that wasn't any help when he photographed the island's outrigger canoe team from an escort boat. "One day there were 40-mile-an-hour gusts and a 10-foot chop," Rik says. "My challenge: Keep my cameras dry and fight off seasickness. When you're seasick, creativity goes out the window."

### MORE GREAT VIDEOS

Find more stories from our authors and photographers, including their best, worst, and quirkiest experiences, at [nationalgeographic.com/ngm/0212](http://nationalgeographic.com/ngm/0212).

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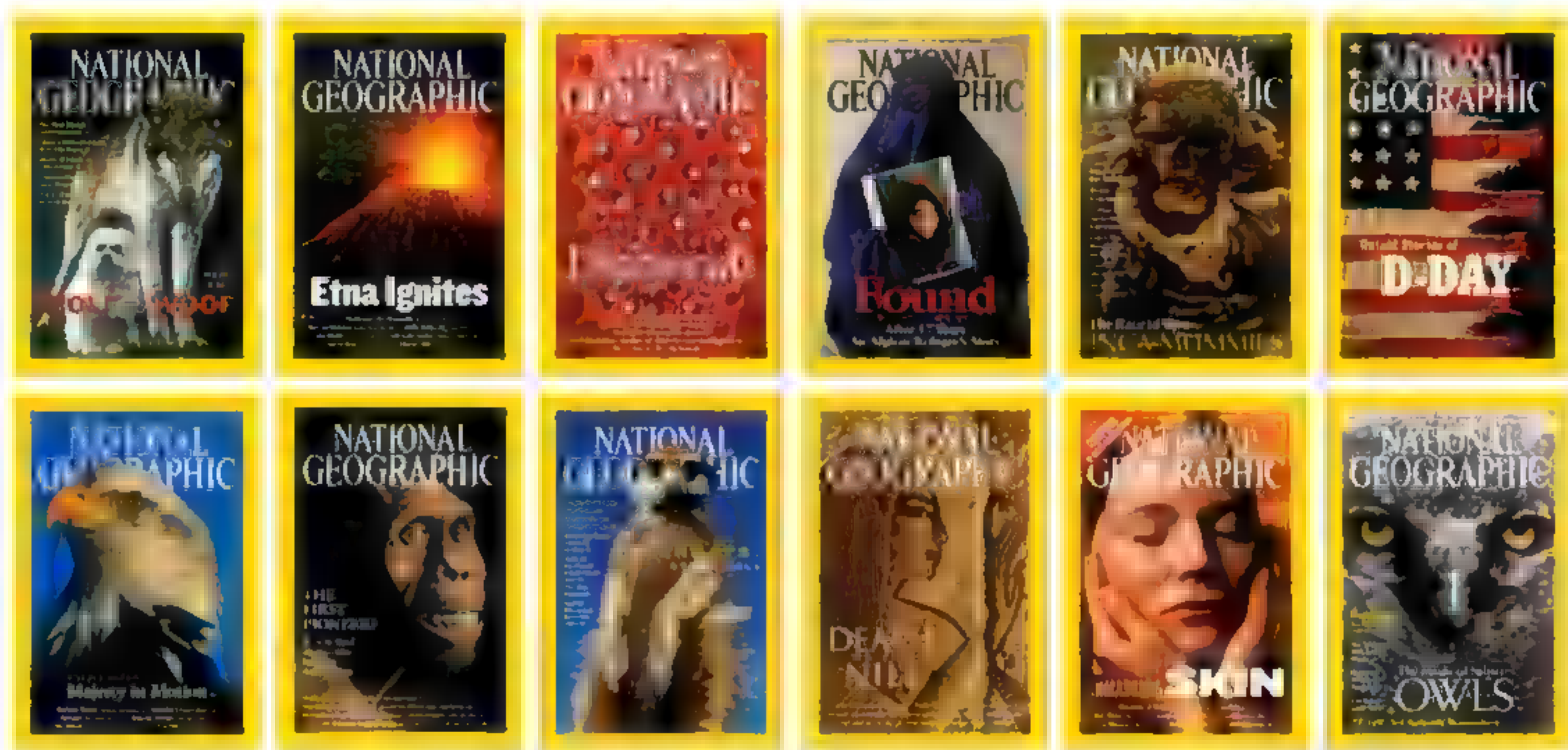
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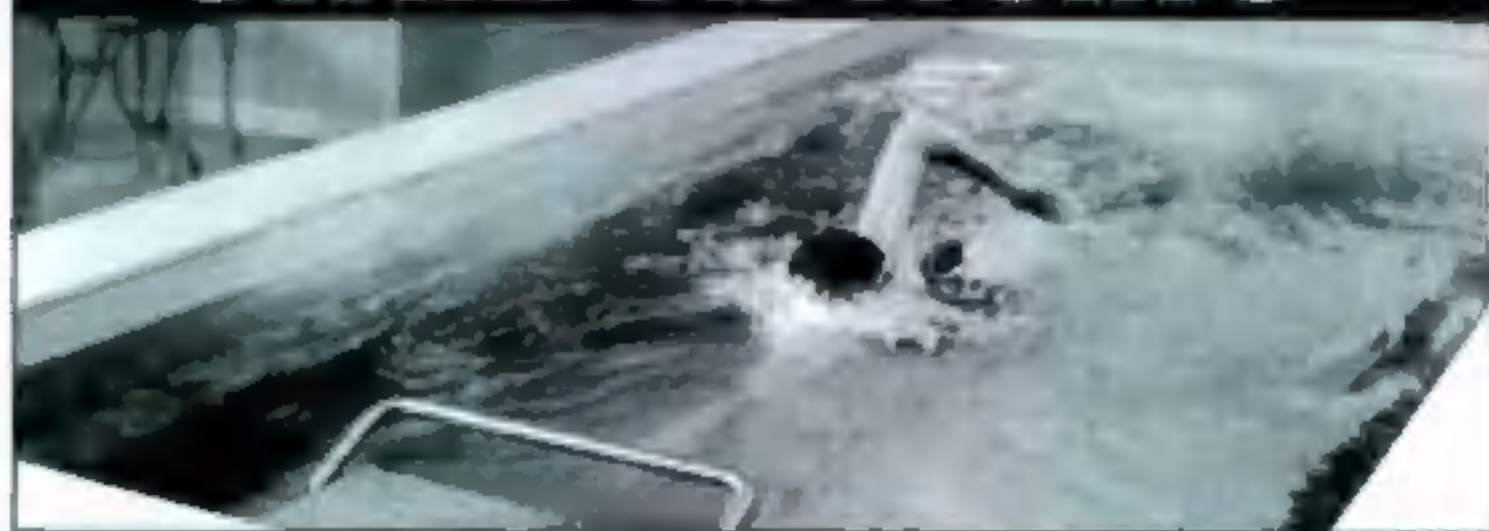
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# Flashback



EWING GALLOWAY

## SURVIVING THE SAHARA

# A Desert Comes to Life

With dolls playing the role of Africans on their tabletop oasis, geography students at a Floral Park, New York, elementary school consult *NATIONAL GEOGRAPHIC* in 1934. They might have found models for their date palms in “Crossing the Untraversed Libyan Desert” (September 1924).

Floral Park was once a kind of oasis itself—one for the eyes—for passengers on the Long Island Rail Road. Fields of flowers at the John Lewis Childs seed company would blaze past the windows as the trains roared by. Childs sold off his land by the early 1920s, and neighborhoods soon bloomed where flowers once did.

This photo has never before been published in *NATIONAL GEOGRAPHIC*.

### MORE ON OUR WEBSITE

You can find this image as well as access the Flashback photo archives at [nationalgeographic.com/ngm/flashback/0212](http://nationalgeographic.com/ngm/flashback/0212).





Photographed by Roger Nickles

# WILDLIFE AS CANON SEES IT

A Trinidad piping-guan walks quietly through tangled vines and epiphytes of the forest canopy, where it remains hidden for much of the day. The birds become more active in early morning and evening, when they feed mainly on fruits, seeds and buds. Their soft piping calls waft across the hills and valleys, a prelude to their display flights above the tree tops, when the piping-guan's wing vibrations produce a loud rattling whir. Once abundant and widespread, the Trinidad piping-guan is now critically endangered due to shrinking habitat and illegal hunting; the

island's only endemic bird now survives in just a few isolated pockets of forest.

As a global corporation committed to social and environmental concerns, we join in worldwide efforts to promote greater awareness of endangered species for the benefit of future generations.



**Trinidad Piping-guan** (*Pipile pipile*)  
Size: Length, 60 cm  
Weight: 2.5 - 3.3 kg  
Habitat: Remote montane rainforest, and also secondary growth near primary forests, in the Northern Range of Trinidad (Trinidad and Tobago)  
Surviving number: Estimated at 70-200

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